

ENVIRONMENTAL ASSESSMENT

Southern Flame Project

(Includes Density Management Thinning, Snag and Coarse Wood Creation and Haul Road Maintenance)

Environmental Assessment Number OR-086-04-01

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USDI Bureau of Land Management
Salem District
Tillamook Resource Area

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Abstract: The Bureau of Land Management proposes to enhance conditions for the development of late seral forest habitat on approximately 970 acres of early to mid-seral forestland. The action would occur within the Nestucca and Trask river watersheds on lands allocated as Late-Successional Reserve (LSR), Riparian Reserve (RR) and Adaptive Management Area (AMA). The proposed locations of the action are in T.3 S., R.7 W., Sections 5, 7, 8, 9, 10, 18 and T. 3 S., R. 8 W., Section 1, Willamette Meridian.

This environmental assessment (EA) discloses the predicted environmental effects of two alternatives: Alternative 1 (Proposed Action) and Alternative 2 (No Action). The proposed action involves the density management thinning (DMT) of approximately 820 acres of 30–55 year-old mixed Douglas-fir/western hemlock forest, the creation of approximately 1.5 snags/acre within the density management units (post harvest), the release of understory conifers and dominant overstory trees by falling trees and creating snags on approximately 150 acres of mid-seral forestland in the vicinity of the density management units, the treating of compacted roads within the density management units, and the maintenance of some of BLMs major rocky haul roads by the removal of overhanging hardwood trees from cutbanks and fill slopes, and some leaning over the road on the downhill side of the roads. The proposed action would be implemented in several phases. The density management and snag creation within density management units and treating of compacted roads used for harvest would occur as two separate timber sale projects. The release of understory and dominant conifers in the non-harvest units by creating snags or down logs would occur as funding allows. The haul road maintenance may occur at the same time as the density management projects or may occur as an independent project depending on funding. None of the projects would occur prior to spring 2005.

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CHAPTER 1.0 PROJECT SCOPE

1.1 Project Location

The proposed action is located in the Nestucca and Trask fifth field watersheds of the North Coast Basin river systems. The proposed locations are in T.3 S., R.7 W., Sections 5, 7, 8, 9, 10 and T. 3 S., R. 8 W., Section 1, Willamette Meridian. These sections are located approximately 12 miles east-northeast of the town of Beaver, Oregon, within Tillamook County. The project area is generally on the watershed divide between the Nestucca and Trask rivers on the southern fringe of the historic Tillamook Burns. (Figure 1)

The proposed project area is located on O&C lands (Oregon and California Railroad Land) and are in the *Late Successional Reserve (LSR)*, *Adaptive Management Area (AMA)* and *Riparian Reserve (RR)* land-use allocation as identified in the *Salem District Record of Decision and Resource Management Plan* dated 1995,(RMP)

The project location is also within designated critical habitat for the marbled murrelet (federal threatened species) and the Northern spotted owl (federal threatened species), the evolutionarily significant unit for Oregon coast coho (federal threatened species), essential fish habitat for coho and Chinook, and is also in the Upper Nestucca Tier 1 Key watershed.

1.2 Purpose of and Need for Action

In the late 1940's through the early 1960's the proposed action area was extensively salvage logged following the historic Tillamook burns. Today the area is overstocked with a dense conifer forest that is 30 to 55 years old where nearly all of the snags not salvaged were felled. The growth and vigor of these stands is beginning to slow as a consequence of overcrowding and competition for the available site resources.

The purpose of the proposed action is to enhance conditions for the development of late-successional forest ecosystems both in the uplands and the riparian areas while protecting what few late-successional habitat features still exist, such as large down coarse woody debris.

By comparing existing resource conditions to desired resource conditions and the management objectives contained in the Nestucca Watershed Analysis, Salem District Resource Management Plan (RMP), Late-Successional Reserve Assessment (LSRA) and the Northern Coast Range Adaptive Management Area guide (AMA Guide), the Interdisciplinary Team (IDT) identified several management opportunities. The following objectives were developed to address those opportunities:

- Accelerate the development of some late-successional forest characteristics such as large green trees, trees with deformities such as broken tops, large limbs, cavities, large snags, down logs, a variety of species, and gaps in the canopy which provide room for establishment of multiple canopy layers.
- Within the younger, more densely stocked portions of the project area, improve stand stability, maintain or increase tree growth rates, and prepare the stand for future management.
- Retain existing desirable habitat features such as snags, trees with deformities and Coarse Woody Debris (CWD) to the greatest extent possible and allow for the development and maintenance of natural processes that produce complex forest features.
- Add CWD in the early decay classes to some areas to accentuate habitat for those late-successional forest-related species that require early decay class CWD and/or prey base for such species.

- Provide snags for cavity dependent species including the northern flying squirrel that is the principal prey item for the threatened northern spotted owl.
- Reduce road density and existing levels of compaction by removing roads that are no longer needed. Reduce existing compaction levels when possible.
- Provide social and economic benefits to local communities by providing opportunities for employment of wildlife and botanical surveyors, equipment owners and operators, equipment and material suppliers, logging contractors, mill owners/operators and their employees and businesses that service all of the above.
- Implement management actions to maintain the existing watershed condition or lead to improved conditions in the long term.
- Apply techniques learned through research, adaptive management and monitoring to develop late-successional forest characteristics such as canopy gaps, multiple canopy layers and other structural features desirable to wildlife; and manage those factors that may retard attainment of late-successional forest such as Swiss needle cast.

The proposed action described in Chapter 2.0 was specifically designed to achieve the objectives previously listed.

1.3 Conformance with Land Use Plans, Policies and Programs

The proposed action is in conformance with the *Salem District Record of Decision and Resource Management Plan*, May 1995 (RMP) and tiers to the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (FEIS).

The proposed action is also in conformance with the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl*, April 1994 ("Northwest Forest Plan" ROD); *Nestucca Watershed Analysis*, October 1994; *Northern Coast Range Adaptive Management Area Guide*, January 1997; *Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area*, January 1998 (LSRA); *Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, January, 2001 (S&M ROD); *Implementation of 2001 Survey and Manage Annual Species Review*, BLM-IM No. OR-2002-064, June 2002, *Implementation of 2002 Survey and Manage Annual Species Review*, BLM-IM No. OR-2003-050, March 2003, *Implementation of 2003 Survey and Manage Annual Species Review*, BLM-IM No. OR-2004-034, December 2003; the *Trask River Watershed Analysis - Final Report*, August 2003, the *Coastal Zone Management Act* of 1974, as amended and *Endangered Species Act* of 1972, as amended (ESA).

1.4 Permits and Approvals Required

The following permits and approvals are in effect and would be used in conjunction with the Southern Flame project to construct, reconstruct and/or use roads on State and Private land.

- Reciprocal Right-of-Way Agreement 1004 – Simpson Resource Co.
- Co-operative Right-of-Way Agreement – Oregon State Board of Forestry – April 1960

The following Biological Opinions and/or Letters of Concurrence would be required from the appropriate Regulatory Agency prior to implementation of this project.

- Biological Opinion from the U.S. Fish and Wildlife Service for *Formal and Informal consultation on FY 2005-2006 projects within the North Coast Province which may modify the habitat of bald eagles, northern spotted owls, and marbled murrelets* (Habitat modification B.O.)
- Biological Opinion from the U.S. Fish and Wildlife Service for *Formal and Informal consultation on FY 2004-2005 projects within the North Coast Province which may disturb bald eagles, northern spotted owls, and marbled murrelets* (Disturbance B.O.).
- Letter of Concurrence from NOAA's National Marine Fisheries Service concerning the determination of effects on the Endangered Species Act (ESA) listed Oregon Coast coho salmon and the Essential Fish Habitat for coho and chinook salmon under the Magnuson-Stevens Fisheries Conservation Act (MSA).

1.5 Decision to be Made

The Tillamook Field Manager is the official responsible for deciding whether or not to prepare an environmental impact statement (EIS), and whether to approve the density management thinning, road maintenance project, and wildlife treatment project as proposed, not at all, or to some other extent.

CHAPTER 2.0 ALTERNATIVES

Since there were no unresolved conflicts concerning alternative uses of available resources identified during public scoping or by the interdisciplinary team, there was no procedural requirement to develop additional action alternatives (Appendix 1). As such, the alternatives that will be analyzed in detail in this environmental assessment include the “proposed action” and “no action” alternatives.

2.1 Alternative 1 (Proposed Action)

The proposed action consists of several treatments that would help restore late-successional forest characteristics and improve the condition of some permanent system roads in the Nestucca and Trask watersheds. These lands are contained within the Late Successional Reserve, Riparian Reserve and Adaptive Management Area land use allocations. This proposed action has been developed to meet the objectives of the project stated in Section 1.2.

The actions are:

- Density Management Thinning - including the creation of some snags and down logs.
- Haul Road Maintenance – includes the removal of some roadside trees (mostly red alder) along some of the major permanent haul roads to reduce surface deterioration, soil raveling or slumping from cut banks and long term maintenance costs.
- Snag and CWD Creation – Wildlife Treatment Units – includes the creation of some snag and down log habitat in forest stands adjacent to some of the Density Management units.

The proposed action would be implemented consistent with the Best Management Practices (BMPs) contained in Appendix C of the RMP; Terms and Conditions of the associated Biological Opinions (BOs) and/or Letters of Concurrence (LOC) from the regulatory agencies and the Magnuson-Stevens Fishery Conservation and Management Act (MSA) Conservation Recommendations.

These projects are described in more detail below.

Density Management Thinning

The proposed action would treat approximately 820 acres of 30-55 year-old mixed Douglas-fir and western hemlock stands. The treatment would include a variably spaced thinning that generally removes the smaller trees from the stands. Clumps of approximately 12-15 trees would be left unthinned at a rate of approximately one clump per five acres. Depending on the stand type, the project proposes to remove between approximately 30-50% of the basal area and 50-70% of the trees. This type of treatment would be considered a light to moderate thinning. Upon completion, the canopy closure is expected to average approximately 50% and would vary between 40% and 60%. Open areas around cable landings and larger sized root disease centers would be planted with locally adapted shade-tolerant conifers. Approximately 80% of the area would be harvested using a cable type system with the remaining area harvested with ground-based equipment. The Density Management would likely be accomplished in two timber sale projects. The first is expected to be offered for sale in 2005 and the second in 2006.

Approximately 35% of the proposed density management would occur within the Riparian Reserve land use allocation. The proposed treatments would be similar in both the Riparian Reserve and in the upland areas, with the exception that there would be “no-harvest” buffers along streams in the Riparian Reserve. “No-harvest” buffers may have yarding corridors cut through them if necessary to yard across, however any trees cut in the “no-harvest” buffers would be left on site to augment CWD in the riparian area.

Design Features:

Design Features for the Density Management thinning have been developed to minimize impacts to water quality and thus ESA listed fish; spotted owls, marbled murrelets and their habitat, native vegetation, and soil resources.

1. Seasons of Operations

Harvest Units:

The following table shows the season of operation for each unit and whether harvest operations are subject to daily time restrictions due to proximity to unsurveyed marbled murrelet habitat. Refer to Figure 2. The “Dry Season” dates of June 15 – October 15 are estimates based on a typical year and are for analysis purposes only; the actual dates would be based on site specific soil and water conditions at the time of operation. Special notice should be taken concerning those units that may be operational prior to July 8 and that may consider using Elk Creek road. Elk Creek road is not available for use between April 1 and July 7 to reduce impacts to spotted owls and marbled murrelets.

Table 1.

UNIT	Total Unit Acres ¹	Year Round (ac)*	Extended Season July 8 - Feb.28 (ac)	Dry Season June 15 – October 15 (ac)*	Dry Season July 8- October 15 (ac)	Extended Cable (July 8 –Feb 28) or Dry Season Ground (July 8- Oct. 15) (ac)	Daily Time Restrictions ² April 1- Sept 15
1-1	162	107		55			No
5-1	122	36		86			No
5-2	15	15					No
7-1	180			180			No
7-2	34	19		15			No
8-1	11	11					No
8-2	35	12		23			No
8-3	7			7			No
8-4	22			22			No
8-5	38		38				Yes
9-1	68				68		Yes
9-2	45				45		Yes
10-1	5		5				Yes
10-2	24					24	Yes
10-3	24		7			17	Yes
18-1	27			27			No
Totals	819	200	50	415	113	41	

***Hauling on Elk Creek road is prohibited between April 1 and July 7 both days inclusive.**

¹ Acreages are estimates based on GIS computations

² Operations limited to two hours after sunrise and two hours before sunset between April 1 and Sept. 15 both days inclusive.

Roads:

The major BLM controlled haul roads that would be used by this project are Elk Creek, Bear Creek, Bear Ridge, Clarence Creek, the Nestucca Access road and possibly Bible Creek Access road. These are the only haul roads that will be analyzed by this EA. Use of other BLM controlled haul roads would be outside the scope of this analysis. Any hauling to the north towards the town of Tillamook would use Oregon Department of Forestry controlled roads of which the BLM has no discretion to limit the use of. North of the project area is the Tillamook State Forest which is comprised of younger seral forest and does not contain suitable habitat for the spotted owl or the marbled murrelet. As a consequence, no daily or seasonal time restriction would apply to northward hauling.

The following design features pertain to the use of BLM controlled roads:

- All road construction and reconstruction would be done during the dry season, generally June 15 through October 15 with the exception of Units 8-5, 9-1, 9-2, 10-1, 10-2, and 10-3 where construction and reconstruction activities cannot commence before July 8.
- All hauling and road maintenance work done during the “wet season” (generally outside of the period between June 15 and October 15) would be subject to the following stipulations to minimize negative impacts to water quality and fish habitat:
 - ◆ The BLM would maintain authority to suspend hauling activities that may affect ESA listed fish.
 - ◆ Notification must be made to the BLM before the purchaser would be allowed to haul.
 - ◆ Hauling and maintenance activities would be suspended when conditions exist that may cause the generation of excessive sediment, such as intense or prolonged rainfall; or when the road surface is deteriorating due to freeze-thaw cycles or from excessive use.
 - ◆ Weekly inspection of road conditions would occur during haul periods.
 - ◆ Spot rocking and/or sediment traps would be employed as needed to reduce the potential sediment inputs to area streams and to protect the road surface. Sediment traps would be inspected weekly during the wet season and trapped sediments would be removed once the trap has filled to $\frac{3}{4}$ capacity.
 - ◆ To the extent feasible, road maintenance activities that could result in sediment leaving the roadway would be scheduled during periods of dry weather (as early as May 1 through approximately October 15).
 - ◆ Bear Creek Road would be available for use year round until signs of deterioration are noted (i.e. rutting, fine sediments entering ditch lines, subgrade pumping, existing slump becomes active, etc). Once Bear Creek road has reached a condition during the wet season where maintenance is required for continued use, the road would be closed to further use for the remainder of the wet season. Emergency maintenance measures may be required to secure the road until the following dry season at which time the appropriate maintenance can occur to allow the resumption of hauling.

Elk Creek Road:

The use of Elk Creek Road is limited to July 8 of one calendar year and February 28 of the next, both days inclusive. Between July 8 and September 15 (both days inclusive) operations are limited to the hours between two hours after sunrise and two hours before sunset for the following road segment:

Elk Creek Road - MP 0.0 – MP 4.0

Bear Creek, Bear Ridge and Clarence Creek Roads:

The use of these roads is available year round, however for some portions of these roads, between April 1 and September 15, daily time restrictions would apply for all operations that would produce noise above the ambient level (operations limited to those hours between two hours after sunrise and two hours before sunset). The following list shows the road segments that would be subject to daily time restrictions:

Bear Creek Road- MP 0.0 – MP 4.1

Bear Ridge Road- MP 0.0 – MP 4.0 (All)

Clarence Creek Road- Jct. Bear Ridge road – North 0.5 miles

2. Road Construction, Reconstruction and Decommissioning

All road construction and reconstruction would be of temporary road type and would be decompacted, waterbarred and blocked to all vehicle traffic including OHV's, at the completion of the project. In general, new roads would be located on stable ridges away from riparian areas. The clearing limits for new road construction would be kept as narrow as possible to reasonably provide safe passage. Native vegetation would be planted or seeded on the decompacted road surface during the appropriate season. The subsoiling and decompaction of reconstructed roads would result in a net decrease in road mileage with the Nestucca and Trask watersheds. Less than 10% of the new or reconstructed road may be rocked in order to allow for harvesting operations on some units during the wet season. Typically the rocked portions would be short spurs less than 400 feet (the spurs would only be rocked if the Purchaser chose to conduct operation during the wet season). The rocked road segments would be decompacted with an excavator rather than a subsoiler, as would be used for the natural surface roads. The following table shows the estimated amount of road needed for the project (excluding permanent haul roads), and the net decrease in watershed road density.

Table 2. Approximate lengths of temporary road construction, reconstruction and decommissioning

	New Construction	Reconstruction
Natural Surface	10,300 ft.	8,400 ft.*
Potentially New Rocked Surface	1,200 ft.	400 ft.
Totals	11,500 ft.	8,800 ft.
Approximate total for the project = 20,300 ft. (\approx 4 miles)		
Approximate net decrease in road density after decommissioning = 8,800 ft. (1.7 miles)		
Decrease in road is result of decommissioning of reconstructed roads.		

*Approximately 45% of the road length to be reconstructed was rocked for operations in the 1950-60's. The rocking is discontinuous and for the most part seriously deteriorated. These roads would be treated as natural surface in that only dry season operations would be permitted across them and they would be subsoiled in the same fashion as other non-rocked natural surface roads.

- Limit cable yarding corridors to the narrowest necessary to reasonably facilitate yarding (generally 15 feet or less), and space them approximately 150 feet apart or greater if possible. Limit cable landing size to the minimum required for a safe operation.
- At least one-end suspension of logs would be required regardless of yarding system. Full suspension of logs would be required generally within 25 feet of the edge of stream channels during the dry season and within 50 feet during the wet season.
- Cable logging systems would be capable of at least 75 feet of lateral yarding.
- Use designated skid trails to limit areal extent of skid trails and landings to less than 10% of the unit; and keep skid trail cutting limits to the narrowest width and landing size to the smallest necessary to reasonably harvest the unit (for analysis purposes, assume a 12 foot wide impact area for skid trails and a 50 foot diameter impact area for landings). Use existing skid trails and landings to the extent possible.
- Subsoil major skid trails – generally those that have had many passes, are wider, and are compacted to the point that potential root growth as been severely compromised.
- Retain and protect to the greatest extent possible green trees with characteristics desirable to wildlife (broken or forked tops, hollow cavities, large limbs, etc.) Protect existing CWD, including snags to the extent possible.

9. Retain trees >20 inches diameter breast height (dbh). If trees >20 inches dbh must be cut, retain on site to augment CWD.
10. Upon completion of harvest, create 1.5 snags/acre to mitigate the loss of currently existing snags from the harvest operations, and the loss of future snags that would have developed over the next 30 years through the stem exclusion process. 2/3 of the snags would be created by basal girdling and 1/3 would be created by crown girdling.
11. Retain all non-merchantable western hemlock understory trees, hardwoods >10 inches dbh and, within *Phellinus weirii* infection sites, all hardwoods.
12. Select Douglas-fir trees for retention that show reduced symptoms of infection with Swiss needle cast disease.
13. Limit log lengths to 40 feet plus trim to reduce damage to the residual stand.
14. If necessary, limit cutting and yarding during the bark slip period (generally May 1- July 15) if excessive damage is occurring to the residual stand, particularly to western hemlock.
15. Maintain a “No-Harvest” buffer on streams – 50 feet along non-fish bearing streams and 100 feet along fish bearing streams.
16. Prior to entering BLM lands each work season, equipment would be washed in an approved way in order to minimize the spread of noxious/exotic weeds.

Haul Road Maintenance

On Elk Creek, Bear Creek, and Bear Ridge roads (see figure 3) trees would be cut and removed from roadside cut banks and fill slopes. In general these trees are red alder and other hardwoods that are growing out over the road surface and thus exerting leveraged pressure on the cut bank soil. As these trees increase in size, so does the pressure exerted on the cut bank soil eventually resulting in the tree pulling out of the slope and causing soil raveling and/or slumping which in turn results in higher maintenance costs and possibly some negative impacts to water quality. In addition, those trees on the lower side of the roads that lean over the road would also be cut. The trees on the lower side tend to be the first rank trees that are growing toward the opening over the road. Trees overhanging the roads keep the road from drying out and contribute to rock contamination and result in greater impacts to the road surface and greater maintenance costs. This activity would not occur in areas where the targeted trees are the primary source of shade on watercourses such as the lower Elk Creek area.

Most of these trees are 15-30 years old and range in size from 4 – 12 inches with a few trees of merchantable sawtimber size, perhaps up to 20 inches. Most likely these trees would be removed commercially as miscellaneous forest products. Below are the estimated mileages for each road over which this maintenance activity would occur.

Elk Creek Road:	5.3 miles
Bear Creek Road:	5.0 miles
Bear Ridge Road:	4.1 miles

It should be noted that in any given mile only those trees that meet the general criteria above would be targeted and not all trees along those miles.

This activity is expected to be accomplished in conjunction with the Density Management Thinning projects but it is possible that it may occur either before or after the thinning project.

This activity would be subject to the daily and seasonal restrictions pertaining to roads as stated above under the Density Management Thinning section of the proposed action.

Snag and CWD Creation – Wildlife Enhancement Units Only

On approximately 150 acres in the vicinity of the proposed Density Management thinning, the proposed action would create two snags and one down log per acre (see figure 2). The targeted trees would be 15-20 inches dbh and would be selected singularly or in small groups. The groups would be placed in such a way, if possible, to release suppressed understory conifers or dominant trees that are targeted for additional growing space to allow for the maintenance or acceleration of growth rates. This activity would occur in both the Riparian Reserve and upland areas. Snags would be created by both basal and crown girdling. Depending on season of activity, daily and seasonal time restrictions may apply. This portion of the proposed action would be accomplished as funding becomes available and may occur before, during or after the Density Management Thinning projects.

2.2 Alternative 2 (No Action)

Under the No Action alternative the BLM would not implement the Density Management Thinning, Haul Road Maintenance or the Snag and CWD Creation in the wildlife enhancement units. The local plant and animal communities would be dependent on and respond to ecological process that would continue to occur based on the existing condition. Neither the beneficial or negative impacts associated with the proposed action would be realized. This alternative would serve as the baseline for comparing effects of the action alternative.

CHAPTER 3.0 AFFECTED ENVIRONMENT and ENVIRONMENTAL EFFECTS

In accordance with law, regulation, executive order and policy, an interdisciplinary team reviewed the elements of the human environment to determine if they would be affected by the alternatives described in Chapter 2.0. Those elements of the human environment that were determined to be affected define the scope of environmental concern (See Appendix 2). This chapter describes the current condition and trend of those affected elements, and the environmental effects of the alternatives on those elements.

For a full discussion of the physical, biological and social resources of the Salem District, refer to the FEIS (*Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*), September 1994. The discussion in this environmental assessment is site-specific and supplements the discussion in the FEIS.

3.1 Threatened or Endangered Wildlife Species, Habitat and/or Designated Critical Habitat

3.1.1 Affected Environment

The species analyzed below were the only species listed under the Endangered Species Act for which the Southern Flame project was likely to impact. The specialist report found in the Southern Flame project record in the Tillamook Field Office, contains more information concerning which species were considered. Only those species for which there may be an impact are analyzed here.

Northern Spotted Owl –

The proposed action area is within Designated Critical Habitat for the spotted owl. The proposed project area currently only serves as spotted owl dispersal habitat, which would support owls for short periods of time as they move through the area. Occupied spotted owl territories are quite rare in the northern Oregon Coast Range mainly due to the lack of unfragmented late-seral habitat. The nearest known spotted owl site is approximately four miles to the west of the project area in the Moon Creek drainage, which contains good old-growth habitat. The last year that the pair in Moon Creek was detected was in 2002, with no detection in 2003. There is good suitable owl habitat south of the project area along the Elk Creek, Bear Creek and Bear Ridge haul routes. These suitable stands have not been surveyed since 1993. The impacts to Designated Critical Habitat would be the same as those described for the owl as a species since the project is not expected to harm individual owls, but rather would impact owls by manipulating their habitat and/or causing disturbance that could result in nest failure.

Marbled Murrelet –

The proposed action area is within Designated Critical Habitat for the marbled murrelet. There is no marbled murrelet habitat within the project area and the project does not propose to modify any suitable habitat. The proposed action is designed to help develop older forest characteristics that are desirable to wildlife including the marbled murrelet, such as large limbed trees with complex structure. In the long term (greater than 30 years) the action area is expected to become better murrelet habitat. The nearest murrelet known site is approximately 1/2 miles south of the project area in the Elk Creek drainage. The known site stand resides between the Elk Creek and Bear Creek roads, but is slightly greater than 1/4 mile from each.

Bald Eagle –

There is no habitat suitable for bald eagle nesting, roosting or foraging within any of the density management or wildlife enhancement units. There is good habitat for eagles south of the action area units along Elk Creek and Bear Creek. There is an historic eagle nest along Elk Creek approximately 1/2 mile south-southeast of the units in

Section 8. The nest has not been active since 1995 with the last successful breeding in 1982. Annual monitoring of the nest area is still conducted.

3.1.2 Environmental Effects

The analysis below includes the direct, indirect and, in separate sections, cumulative effects of the proposed action.

The area of analysis for cumulative effects is the Upper Nestucca (Core zone) Mixed-Seral (landscape cell) landscape zone and cell (LSRA 1998). The proposed project area lies in the northwest corner of the zone and cell. The analysis area is approximately 48,000 acres of which 80% is under BLM management with the remainder about equally divided between Siuslaw National Forest, Oregon Dept. of Forestry, private industrial forest and other private lands.

3.1.2.1 Alternative 1 (Proposed Action)

Northern Spotted Owl –

- Habitat Modification

The conditions that keep younger more structurally simple stands from being good suitable habitat for spotted owls are the lack of nesting substrate, such as large sheltered platforms or large cavities, lack of a vertically diverse hunting venue and the lack of habitat for a suitable prey base, which is primarily the northern flying squirrel in this area.

The proposed action is expected to eventually result in a more structurally diverse stand, both vertically and horizontally that may provide for better owl foraging and nesting opportunity, but in the mean time would continue to function as dispersal habitat after harvest. However, one drawback of the action is that the natural development of snags would be halted for the next 20-30 years (Carey 1991). The resultant loss of the future snag potential coupled with the direct loss of some of the few snags that currently occur in the project area through logging operations will have a negative impact on woodpecker populations and thus the secondary cavity users that depend on woodpeckers to provide shelter. A secondary cavity user that is of particular importance to the spotted owl is the northern flying squirrel.

Throughout the range of the northern spotted owl, flying squirrels are of primary importance as a food source for the owl. In the northern part of the range where there are few if any woodrats, the flying squirrel can make up over 60% of the diet of spotted owls (Carey 1991, Forsmen et. al. 1991). Flying squirrels have been found to be about twice as abundant in late-seral and old-growth stands as in younger seral stands and their presence is positively correlated to the abundance of large snags (Carey 1991, Corn and Bury, 1991). Carey finds that flying squirrels apparently play a major role in determining the carrying capacity of Douglas-fir and western hemlock landscapes for spotted owls; he also notes that most cavities used by flying squirrels seem to be abandoned woodpecker holes; thus postulating that the presence of woodpeckers may be essential for high populations of northern flying squirrels (Carey 1991).

The proposed action would create 1.5 snags per acre in the density management units (820 acres) after harvest and 2 snags and one down log per acre in the wildlife enhancement units (150 acres). The creation of these snags should provide a modest amount of woodpecker habitat for the next 5-10 years and will help offset the negative affect of the thinning. A model developed by Jack Ward Thomas and later updated by Neitro et. al. estimated that 1.8 snags per acre would support 60% of potential woodpecker population for the area. Since the proposed action area is in early to mid-seral forest condition, the availability of large trees for the creation of high quality large snags is low. By creating snags now in the 15-20 inch size range, the action area may be able to support 50-60% of the potential woodpecker population and therefore keep the cavity creating process active while the stands age. At

such time that the trees are considerably larger, more snags could be created at a later date. By maintaining woodpecker populations, it is hoped that there will be sufficient cavity habitat in the near term (next 5-20 years) to maintain a sustainable population of flying squirrels to support dispersing spotted owls. At such time that the stand becomes suitable for nesting and foraging, in perhaps 30 years, it is hoped that a suitable prey base will be intact when the natural snag creating process starts to become active again (from Neitro et. al. 1985, Salem District FEIS 1994).

The removal of hardwoods along haul roads for road maintenance purposes would not have any appreciable effect on spotted owls. The roads that would have this treatment have been in existence for 30 years or more and now exist on the landscape as a more or less linear gap. The cover over these roads is currently patchy and is not very different than the canopy over many third order streams where hardwoods are arranged in a sinuous pattern within a conifer forest. In general spotted owls tend to avoid open areas but routinely cross roads since they are essentially short gaps to cross. The removal of trees would open some of the more closed over areas but there will still be areas that remain covered with a hardwood canopy and the gap created is expected to be less than 30 feet.

- Disturbance

None of the proposed project units contains any suitable spotted owl habitat. In total there is about 122 acres of suitable habitat within ¼ mile of the proposed density management units. Noise generating activities on these units would be seasonally restricted until after July 7, the end of the critical breeding period. However, there are approximately 1724 acres of suitable owl habitat within ¼ mile of the proposed haul routes along Elk Creek, Bear Creek, Bear Ridge and Clarence Creek roads. Of those acres only 482 acres would be seasonally restricted until after July 7 (Elk Creek road) the rest may have noise generating activities occurring at any time of the year. Since no surveys have been conducted, there may be an unquantifiable amount of disturbance to owls. It is not likely that this disturbance would be directly harmful to individual adult birds but it may result in the loss of nesting potential either by causing birds to avoid nest initiation or by causing nesting failure. It is assumed that disturbance to owls occurring during the critical period between March 1 and July 7 would have more potential to cause nest failure than later in the breeding season when adults have invested more energy in the reproductive process and juveniles are able to move away from potentially disturbing activities (USFWS 2003-2004 Disturbance BO North Coast Province).

- Cumulative Effects – Spotted Owl

Among the management goals of the Upper Nestucca Mixed-Seral landscape zone and cell is the development of late-seral habitat that would benefit the spotted owl. The majority of lands that are in the early and mid-seral stages are in the northern part of the cell and zone, where this project is located. The Tillamook Resource Area is expecting to conduct density management projects in the early and mid-seral stage forest areas at a rate of approximately 400-500 acres, or about one percent per year. Most of the Oregon Dept. of Forestry lands south of the proposed action area have already been converted to early seral stage plantations. The lands to the north are part of the Tillamook burns and are generally being thinned and are expected to continue to be for the foreseeable future, except where Swiss needle cast disease is at levels high enough to prompt them to clearcut harvest and reforest with disease resistant species. Private industrial landowners are expected to continue to clearcut harvest on a 35-50 year rotation (see the cumulative effects analysis for Forest Vegetation in section 3.8.2.1 below for more details). The private lands will most likely never become suitable owl habitat but may in some areas provide dispersal habitat for a short time. Federal lands (including Forest Service) are expected to continue to progress toward late successional forest at various rates depending on local conditions. The two negative impacts associated with the proposed action that could be cumulative over time are; the loss of snags either directly or through lack of development resulting thinning; and repeated disturbance in suitable owl habitat. With the dearth of snags within the cumulative effects analysis area, there is a concern that a regular thinning program could have wide ranging negative effects on the production and availability of snags for both primary cavity excavators and secondary users such as the northern flying squirrel. There have been some snag creation projects that have occurred in the

Nestucca drainage and there is a snag creation aspect to the Southern Flame project, but the analysis area remains at very low levels for snags and will continue to for the foreseeable future. To have the most benefit for cavity users, snag creation would be best carried out in the older age classes that are not likely to have any density management treatments that would pay for the snag creation. Funding for projects that do not produce commercial product is very limited and is expected to remain so in the foreseeable future. The other potentially detrimental effect of a regular density management program occurring within the analysis area is the potential for repeated disturbance to owls in unsurveyed habitat that may cause a potential reduction in overall breeding success for the species which may prolong the recovery of the species.

Marbled Murrelet –

The direct or indirect impacts that may affect murrelets are of the disturbance type only. The only impacts to Designated Critical Habitat that would be expected would be those potentially long term benefits that would occur in the future as a result of the proposed action.

Activities that generate noise above the ambient level within ¼ mile of marbled murrelets that are attempting to breed are more likely to cause serious negative impacts during the earlier part of the breeding season (April 1-August 5) than the latter part. Earlier in the season murrelets are more likely to abandon nests or abort feeding visits due to noise disturbance than later when they have either failed to breed successfully for other reasons or have a greater energy investment in a soon-to-fledge juvenile (USFWS 2003-2004 Disturbance BO North Coast Province).

There are 122 acres of unsurveyed suitable marbled murrelet habitat within ¼ mile of any of the Density management or wildlife enhancement units. Activities in these units that generate noise above the ambient forest noise level would be scheduled to occur after July 7. This design feature will serve to limit disturbance impacts to the latter part of the critical breeding period and/or non-critical breeding period. There are also 1724 acres of suitable murrelet habitat within ¼ mile of the proposed haul routes along Elk Creek, Bear Creek, Bear Ridge and Clarence Creek roads. Noise generating activities would be restricted until after July 7 along Elk Creek road but would not be seasonally restricted on the other haul roads. Daily time restrictions that limit noise generating activities to between two hours after sunrise and two hours before sunset would be in affect during the entire breeding season (April 1 and September 15) anywhere within ¼ mile of suitable habitat.

The road maintenance aspect of this project would not alter murrelet habitat but could cause disturbance to bird that may occur in unsurveyed suitable habitat. As with other aspect of this project that cause noise above the ambient forest level, daily operating time restriction along with the identified seasonal restrictions would help minimize impacts due to disturbance.

■ Cumulative Effects – Marbled Murrelet

In general, cumulative effects associated with forest management that may impact marbled murrelets would be the same as those described for the spotted owl above. Federal lands (including Forest Service) are expected to continue to progress toward late successional forest at various rates depending on local conditions. Density management projects like the Southern Flame project are expected to help develop suitable murrelet habitat sooner than would occur without treatment. One potential detrimental effect of a regular density management program occurring within the analysis area is the potential for repeated disturbance to murrelets in unsurveyed habitat that may cause a potential reduction in overall breeding success for the species. Since there is little or no suitable murrelet habitat on state and private land within the analysis area, most all of the potential disturbance to murrelets would result from federal projects on federal land. Daily and seasonal time restrictions are measures that are routinely employed in federal projects that may reduce the potential loss in breeding success associated with disturbance.

Bald Eagle –

The proposed action (density management, snag and CWD creation and haul road maintenance) would not modify eagle habitat in any way, however the project does have the potential to disturb eagles that may be foraging along Elk or Bear Creek. Although there is good nesting habitat along Elk and Bear Creeks, we have not found any nests other than the historic site, therefore we do not expect that the proposed project will impact nesting birds. Disturbance of foraging activities could disrupt eagle behavior and result in lost feeding or hunting opportunity and the possibility of avoidance of the area while noise generating activities are occurring.

- Cumulative Effects – Bald Eagle

Projects such as the Southern Flame project will not negatively impact eagle habitat and may actually improve it over the long term. Disturbance associated with harvesting operations is expected to be dispersed both spatially and temporally and the impacts would not accumulate over time. Eagles in the forested environment are closely associated with riparian habitats that produce fish, especially anadromous fish. In addition to suitable foraging opportunity, only a few suitable nesting structures (i.e. large trees that provide a vantage point and some degree of cover over the nest) are required to make the forested environment suitable. On federal lands within the analysis area eagles and their habitat would continue to improve within the foreseeable future.

3.2.2.2 Alternative 2 (No Action)

See the Environmental Consequences section of the Forest Vegetation analysis of the “No Action” alternative (section 3.8.2.2) for a description of the expected impacts to the forest vegetation component of wildlife habitat.

Under the “No Action” alternative none of the activities described above for the proposed action alternative would occur. Neither the beneficial nor the negative impacts to spotted owls, marbled murrelets or bald eagles would be realized.

The dense forested stands would continue to grow at a declining rate and as competition for site resources intensifies, smaller snags will develop as a result of the death of suppressed trees. These small snags will provide foraging and some nesting habitat for woodpeckers, and a small amount may be suitable for secondary cavity users such as the northern flying squirrel. It will take considerably longer to develop trees of large enough size to contribute appreciably to diverse cavity habitat within the stand that may support larger cavity users such as the spotted owl. Few if any 15-20 inch and larger snags would develop over the next 20-30 years.

These stands would continue to function as dispersal habitat for spotted owls but it is expected that they would stay in the dispersal condition longer; perhaps much longer, than would occur if the stand density were reduced to allow for a more rapid diversification of stand features. Marbled murrelet habitat would be unaffected by either the proposed action or the No Action alternatives in the near term (next 30 years), but it is expected in the longer term that it may take much longer for trees within the action area to develop platform features suitable for use by murrelets. Bald eagles would be unaffected. None of the potential disturbance to ESA listed species caused by the proposed action would occur.

- Cumulative Effects

There would not be adverse cumulative effects resulting from selecting the “No Action” alternative. It is expected that the federal lands in the analysis area will continue to conduct some level of density management thinning (possibly 400-500 acres per year) and those projects may have direct and indirect impacts to ESA listed wildlife species. The private and State lands are expected to be managed in the same way as described in the cumulative effects sections of the proposed action alternative and would not contribute to management of listed species. The BLM will have a density management project in the vicinity of the proposed action active within the next three

years and it will be active for at least one dry season of operation or up to three seasons. Much of the private and State lands in the analysis area are already in early seral stage with many recent harvest operations. The State lands north of the proposed action area are part of the Tillamook burns and generally are being managed with thinning operations and are expected to continue those actions with the exception of areas impacted by Swiss needle cast which may be clearcut harvested.

The forested environment on federal lands within the analysis area would continue to age and other density management projects would be expected to continue to occur and eventually the forested area on federal lands would diversify into a complex forest structure suitable for use by those species requiring late-seral habitat such as the spotted owl and marbled murrelet. Currently, spotted owl populations are declining in the northern coast range and that trend may continue due to a variety of factors. One factor is undoubtedly the lack of contiguous late-seral habitat distributed across the landscape and it is recognized that projects such as the Southern Flame project can speed up the development of some of the habitat features that are required for the conservation of species dependent on late-seral habitat.

By not implementing the proposed action, another area within the Tillamook Resource Area would be selected for density management but would occur at a date later than expected for the Southern Flame projects. The result would be the loss in opportunity to improve the conditions for the development of late-seral habitat that would benefit spotted owls and marbled murrelets in an area where many good late-seral habitat components, such as large down wood and contiguous canopy, currently exist.

3.2 Threatened or Endangered Fish Species or Habitat

3.2.1 Affected Environment

Fish distribution surveys have been completed for all of the streams that originate within the project area. Coho distribution varies from immediately adjacent to units 18-1 and 7-1 to over 3 miles away from units located in the headwaters of Elk Creek (units 5-2, 8-1). On the Trask River side of the divide, coho distribution is expected within approximately one mile downstream of thinning units 1-1 and 5-1. Most of the proposed action area falls within the Testament Creek (Bear Creek) and Elk Creek sixth field watersheds, however there are five subwatersheds (Elk Creek, Testament Creek, Moon Creek, South Fork Trask River, East Fork of the South Fork Trask River) that are affected by this project and provide spawning and rearing habitat for Oregon Coast coho salmon. For each of these five sixth field watersheds, there are seventeen fish habitat indicators that are ranked according to three categories, “Properly Functioning”, “At Risk” or “Not Properly Functioning” (NOAA Fisheries; Matrix of Factors and Indicators for the Coast Range Province- Interim Version July 20, 1998). This data, along with a narrative discussion for each element is contained in a Biological Evaluation (in the Project File at the Tillamook Resource Area office). Within areas of coho distribution in Elk Creek, Testament Creek and Moon Creek subwatersheds, instream habitat restoration work has been completed in the recent past to improve overwintering conditions for juvenile salmonids. Of the seventeen habitat indicators, there are two that have the greatest bearing on this project. For all subwatersheds, Substrate Sediment is rated “At Risk” and Large Woody Debris is rated “Not Properly Functioning”.

3.2.2 Environmental Effects

3.2.2.1 Alternative 1 (Proposed Action)

Density Management Thinning –

- Direct and Indirect Effects

The implementation of the proposed action would raise minor fisheries concerns due to the potential input of sediment into streams from timber harvest, road construction / decommissioning and/or use of haul roads. Sediment has the potential of affecting coho directly by altering behavior and indirectly by changing important habitat components such as the physical makeup of spawning gravels. Harvesting trees within the Riparian Reserve would directly remove a potential source of small wood to stream channels. This small wood is recognized to be an important element in both sediment routing and nutrient cycling processes for the aquatic system. The implementation of this thinning using design features such as “no harvest” buffers on all streams, cable yarding on slopes over 35% slope, full suspension over riparian zones, and dry-season operation for all road construction and ground-based harvest, would minimize potential negative effects. These potential adverse impacts are related to short-term increases in sediment into Bear Creek, Elk Creek, East Creek or into the headwaters of the Trask River; and the short term loss of small but functional wood (Oregon Department of Fish and Wildlife minimum size criteria for wood is 15 cm in diameter by 3 meters in length) from these headwater streams.

In the wet season, during which approximately 35% of the harvest activities may occur (October 16 – June 14) additional measures, including sediment traps, spot rocking and weekly inspections of haul routes, may be required to minimize sediment inputs during the time of year when sediment has the greatest potential to enter streams. As such, any input of fine sediments should not change any streams physical habitat features needed to support fish at the watershed scale. In the Elk Creek drainage above the barrier falls at river mile 2.8, there is a reach of low-gradient stream with beaver ponds and floodplain connections that will store sediment moving in the stream channel, greatly reducing the potential of sediment reaching the upper extent of coho habitat.

This project should not have impacts to the Oregon Coast coho salmon population. With small amounts of sediment input anticipated from harvest, road decommissioning and log haul there is some potential to affect individual coho or habitat. These potential impacts are likely to be of short duration (i.e. during the first substantial rains and within a year or two of the action occurring). In addition, any impacts would occur at the site scale, an example being the input of road sediment at a stream crossing via the roadside ditch. These site scale potential impacts are addressed through the use of design features such as the use of durable rock for road surfacing, sediment traps in ditches with direct ties to live streams, and weekly inspections of those structures to maintain their functionality. As these inputs of fine sediments (visible as turbidity) would occur during the wet season when background levels of turbidity are naturally higher, there would be no adverse behavioral changes anticipated by coho spawning or rearing near these specific sites. The amount of fine sediments delivered to stream channels is anticipated to be small and separated in both time and space. Functional changes in spawning or rearing habitat for coho are not anticipated in either the Trask or Nestucca Watersheds.

- Cumulative Effects

The analysis area for cumulative effects to fish and fish habitat is the Elk Creek, Testament Creek (Bear Creek is within this sixth field), Moon Creek (East Creek is the only portion of this sixth field included in the proposed action), South Fork Trask River, East Fork of the South Fork Trask River, and Upper Nestucca River sixth-field watersheds. Effects that have the potential to be caused by the Southern Flame project and that may be cumulative in relation to other actions that may occur in the analysis area include 1) sediment from hauling from multiple timber sales in the area and, 2) the loss of CWD from riparian zones. Other known actions in the area include a ten year Right of Way (ROW) agreement issued by BLM that permits the hauling of private timber down Bear Ridge Road, ReBear Density Management Timber Sale, other ongoing reciprocal Rights of Way agreements with the State of Oregon and private timber owners that permit the hauling of timber on BLM roads in the analysis area. Sediment associated with log hauling from the various actions in the analysis area is generally not anticipated to increase noticeably on any of the major haul routes. The various actions would occur in the watersheds on different haul routes, during different time periods; there is however some potential for overlap. Where hauling from multiple actions occurs during the wet season on one route the amount of road related sediments would be anticipated to increase proportionally. The greater the amount of use of a specific road during the wet season the greater the potential for impacts to individual coho (i.e. an aversion response). Due to the stream type in this action

area no measurable change in stream sediment levels that would be adverse to coho spawning or rearing are anticipated. Due to the use of several haul routes and the likely separation in time for most of the activities, the increase in road-related sediment is not anticipated to have a negative impact on habitat or any individual fish in these watersheds. The amount of sediment generated from hauling will be immeasurable compared with the background sediment levels in these streams.

The proposed action will harvest some trees from Riparian Reserves that meet the minimum CWD size, and private and ODF timber harvest actions will likely also remove trees from these near stream areas. For the analysis area however, the majority of the ownership in the Nestucca Watershed is federal land and is managed for long-term improvement of both the Riparian Reserve and upland areas for late successional species (large trees). On the Trask Watershed side a larger amount of potential CWD will likely be removed from State or private timber lands. The CWD data for the proposed action area shows that there are high levels in the riparian reserves of all the harvest units. The other federal action in the area (ReBear TS) is not anticipated to reduce CWD levels. As all the federal actions in the area are located on stable slopes (limited potential for landslides), CWD inputs are likely to originate from trees falling into the stream, and because they are not likely to be associated with landslides, delivery to habitat occupied by coho is not probable. Overall, due to the ownership patterns there is the potential of a small decrease in the amount of CWD recruited into stream channels from actions on the Nestucca Watershed portion and a higher potential on the Trask Watershed area. With the current amount of CWD at a level determined to be Not Properly Functioning, further decreases have the potential of reducing the rearing potential of streams for coho. This decrease in rearing potential is related to coho's affinity for complex habitats that CWD can help provide by being a primary pool forming element in coast range streams. With the maintenance of this condition fewer coho are likely to rear in these stream segments.

Haul Road Maintenance –

- Direct and Indirect Effects

The haul road maintenance action is unlikely to alter the current condition of the aquatic system either by affecting streamflow, stream channel and bank stability, water temperature, or sediment regime. Removing small trees on roadside cut banks would decrease the incidence of roadside slumping, the most common type of road slope failure, with the possibility of a slight increase in short-term soil erosion. The net effect would be a small decrease in the amount of sediment delivered to roadside ditches which could enter adjacent streams, which lowers the possibility of negative effects to coho salmon.

- Cumulative Effects

Road management activities (removing small trees in roadside cut-banks) would have a minimal positive effect upon coho habitat as a reduction in sediment sources from the road surface (decreased need for grading / rock replacement) and cut banks is anticipated through time.

Snag and CWD Creation – Wildlife Enhancement Units Only –

- Direct and Indirect Effects

As several of the wildlife treatment units are adjacent to streams that may be occupied by coho, the addition of CWD into or adjacent to the stream has the potential of being both beneficial to habitat and potentially adverse to individual fish. Snag and CWD creation activities are likely to result in small, localized benefits to riparian and aquatic habitat by accelerating the growth of conifer trees and potentially increasing the amount of CWD. There is a possibility of sediment delivery if any trees are felled into or near streams. Any increase in sediment and turbidity would be small, of short duration, and localized.

- Cumulative Effects

Snag and CWD creation activities would have a minimal beneficial effect to fish habitat in the analysis area. As these activities are only associated with federal lands the area of beneficial effects are limited.

3.2.2.2 Alternative 2 (No Action)

- Direct and Indirect Effects

No action would occur under this Alternative, therefore no direct or indirect effects would occur to fish or fish habitat. Adverse impacts from sediment related to harvest or haul, and loss of potential CWD would be avoided. Foregoing haul road maintenance could have some impact on individual fish or habitat. Without the roadside treatment of trees from the cut or fill slopes there is the potential of increased sediment inputs due to these trees falling over. These trees are most likely to fall during the winter because of high soil moisture levels, high winds, and accumulations of snow and ice. The result is likely to be an increase in soil movement into roadside ditches and an increase in road maintenance activities that can result in sediment delivery to streams.

- Cumulative Effects

Under the no action alternative there are no impacts that would be cumulative to the other actions within the analysis area.

3.3 Water Quality

3.3.1 Affected Environment

The project area is located primarily in the upper headwaters of the Nestucca River 5th field watershed, a Tier 1 Key Watershed. A small portion (about 13%) is in the South Fork Trask River 5th field watershed. There are three primary streams (3rd or 4th order) draining the area, the Bear Creek, upper Elk Creek, and Tucca Creek. Most streams adjacent to harvest units are small, intermittent headwater streams, about 55 in number.

Project streams are generally adequately shaded. Water temperatures are expected to be generally near reference condition. Most streams are deficient in large woody debris and associated structural elements due to past wildfires and forest management practices. Suspended sediment and turbidity are generally quite low in the upper Nestucca watershed except for short periods in the fall and winter. Recent data compares favorably to current targets for substratum sediment composition (Nestucca Bay Watershed TMDL (Total Maximum Daily Load), p. 66). With the exception of Bear Creek, most stream banks are generally stable. Bear Creek is believed to be the single largest chronic source of high turbidity and fine sediment in Nestucca River watershed (Nestucca WA, p.11). One area of unstable streams is an active soil creep along upper Bear Creek and Unit 7-1. It is approximately 50 to 150 feet wide by 1,500 feet long.

3.3.2 Environmental Effects

3.3.2.1 Alternative 1 (Proposed Action)

Density Management Thinning –

- Direct and Indirect Effects

Forest management effects on water quality and quantity would be similar to those described in the Salem District RMP/EIS (Chapter 4, pp. 21-25).

The proposed action is unlikely to alter the current conditions either by affecting its in-stream flows, physical integrity, water temperature, or sediment regime. The proposed action is not anticipated to change the overall amount of stream shade; therefore no changes in stream temperatures are expected. There should be no measurable change in stream flows because the project involves only thinning on less than 5% of any affected subwatershed.

Reconstruction of a road - stream crossing in Unit 6-1 would likely move a small amount (<1/2 cubic yard) of sediment into a low gradient, non-fish bearing, intermittent stream. Little downstream movement of sediment is expected, none of it to a fish-bearing stream.

Timber hauling on forest roads would be near some streams and is therefore likely to generate fine sediment that could potentially increase local stream turbidity. Any increase is expected to be small and short-term because 1) haul roads are in good condition and have had extensive maintenance in recent years and 2) implementation of BMPs and design features such as seasonal haul restrictions and “wet season” measures such as weekly inspections, installing spot rocking and/or sediment traps would reduce sediment delivery.

Additional actions would further minimize sediment delivery to streams: 1) Most roads to be used are located on gentle slopes, stable ridgetops or bench areas away from drainage channels; 2) Logging would avoid steep or unstable slopes where there is high risk of mass wasting; 3) Cable yarding and small treatment area would minimize ground disturbance on the active soil creep area that borders Bear Creek in Unit 7-1; 4) Stream buffers would filter nearly all of the sediment moving off skid trails and roads from reaching streams; 7) After logging is completed, roads would be decommissioned by decompacting the road surface (subsoiling), water-barring where appropriate and blocking to traffic. Subsoiling would increase infiltration of water, decrease water runoff, facilitate revegetation, and reduce long-term erosion.

Thinning is expected to accelerate the growth rate of the trees that remain in the Riparian Reserves and increase the quality and volume of large woody debris in the future. The removal of small diameter trees from Riparian Reserves would likely result in a short-term reduction of small woody debris input to the stream influence zones and channels. Small woody debris has benefits and functions within aquatic habitats. However, because of the relatively high levels of existing large woody debris, reduction of small wood input is expected have a minimal effect on the functioning of the aquatic habitats (Silvicultural Prescription Report, Coarse Wood section, pp. 10-35, found in Southern Flame project record).

- Cumulative Effects

Sedimentation and turbidity:

Other logging operations and timber hauling are likely to occur in the same geographic area around the time of project implementation. The proposed action is likely to contribute a small, probably immeasurable, sediment input to different streams over a period of years. The cumulative effect would unlikely to be large enough to alter the current conditions of the aquatic systems including the physical integrity, water quality, and sediment regime.

Haul Road Maintenance –

- Direct and Indirect Effects

The proposed action is unlikely to alter the current condition of the aquatic system either by affecting its in-stream flows, physical integrity, water temperature, sediment regime, or in-stream flows. Removing small trees in roadside cut-banks would decrease the incidence of surficial slumping, the most common type of road slope failure and possibly slightly increase short-term erosion. The net effect would be a small decrease in the amount of soil

and sediment delivered to roadside ditches which could possibly enter local streams. The reduction of sediment delivered to streams would be small, likely immeasurable, and would not change the current sediment regime.

- Cumulative Effects

The project action is unlikely to contribute to cumulative effects to water quality because it unlikely to produce any measurable effect to sediment and turbidity.

Snag and CWD Creation – Wildlife Treatment Units Only –

- Direct and Indirect Effects

Snag and CWD creation activities are likely to result in small, localized benefits to riparian and aquatic habitat by accelerating the growth of understory conifer trees and slightly increasing amount of CWD. There is a possibility of sediment delivery if any trees are felled in or near streams. Any increase in sediment and turbidity would be small, short duration and localized.

- Cumulative Effects

Snag and CWD creation activities would have a minimal additive effect to water resources.

3.3.2.2 Alternative 2 (No Action)

As no management activities will be implemented under this alternative, no effects to water resources would occur. Hydrologic processes such as annual yield, low flows, and peak flows would continue to respond to existing conditions and would continue their current trends of change. On the haul roads, the trees on the cut-banks would continue to grow larger and tip over and cause more slumping and as a resulting would continue to be a source of small inputs of sediment to the stream systems.

- Cumulative Effects

Since the effects of the no action alternative are practically imperceptible at the site scale, there would be no adverse cumulative effects at the watershed scale. Cumulative effects to the watershed would continue to occur from forest management activities (primarily timber harvesting, and road construction and maintenance) on private and state lands; and federal lands where other projects are implemented. By not implementing the proposed action another area within the Tillamook Resource Area may be selected for density management at a later date and many if not all of the impacts associated with the Proposed Action would occur in a different area.

3.4 Invasive, Nonnative Species (Executive Order 13112)

3.4.1 Affected Environment

Existing vegetation consists of a 30-55 year-old conifer over-story, scattered pockets of hardwoods, an under-story of common shrubs and scattered populations of grasses and forbs. A comprehensive species list is located at the Tillamook field office. Any ground-disturbing activity offers opportunity for the introduction of noxious weeds and/or invasive non-native plant species based on the existence of a seed source. *Cirsium vulgare*, *Cirsium arvensis*, *Hypericum perforatum*, *Ilex aquifolium*, *Rubus discolor*, *Rubus laciniatus*, *Senecio jacobaea*, and *Cytisus scoparius* are noxious weed species commonly found in the vicinity of the project areas. All of the noxious weeds that currently exist within the vicinity of the project area are designated Priority III (established infestations) on the Oregon Department of Agriculture (ODA) noxious weed list. These weed species are commonly found throughout Western Oregon tending to occupy areas of high light. Some degree of noxious weed / non-native

species introduction or spread is probable as management activities occur in the project areas. It is expected that as disturbance occurs and more light becomes available these species could potentially invade the site.

3.4.2 Environmental Effects

3.4.2.1 Alternative 1 (Proposed Action)

- Direct and Indirect Effects

Soil disturbing activities such as road construction, reconstruction and decommissioning; tractor skid trail development, landing use and haul road maintenance are the most likely activities that could produce conditions conducive to noxious weed establishment. Project design features that require seeding or planting highly disturbed areas with native species would allow natural plant succession to proceed therefore ameliorating the invasion of non-native species. In time, non-native species are expected to return to low levels as native vegetation becomes re-established and crown closure of the residual stand reduces available light to the under-story. Because of the limited alteration of habitat associated the snag and CWD project within the wildlife treatment units there is not expected to be any increase in noxious weed populations.

- Cumulative Effects

The analysis area for cumulative affects to noxious/non-native invasive plant species is the upland portions of the Trask and Nestucca Watersheds specifically the headwaters of Elk Creek, Bear Creek, East Creek, East fork of the Trask River, and the South fork of the Trask River. Land management activities vary based on ownership and management practices. Examples of forest management activities within the affected area are regeneration harvest, commercial and pre-commercial density management thinning, young stand maintenance, new road construction, road decommissioning, road maintenance, culvert replacements, and helicopter landing zones. Activities that don't necessarily create disturbance but influence the spread of weed seeds are recreational hiking, biking, fishing, and hunting. Other sources of seed dispersment are from wildlife that are either passing through or frequent the area, water movement, and wind. Many past and present management activities tend to open dense forest settings and disturb soils therefore provide opportunities for widespread weed infestations to occur. Many, if not all of the weed species identified on the Priority III (established infestations) on the Oregon Department of Agriculture's (ODA) noxious weed list are present throughout the area. Because of their presence throughout both of these watersheds seed is readily available for dispersion. Most non-native weed species are not shade tolerant and will not persist in a forest setting as they compete for light when tree canopies close and light to the under-story is reduced.

The affects of implementing Alternative 1 will have a limited influence on increasing weed populations in this area. The weed seed that could be dispersed is limited by design features that mitigate infestations by introducing competing native grass seed on disturbed sites as well as blocking access to vehicular traffic on decommissioned roads, and implementation of a roadside maintenance program on the main roads.

3.4.2.2 Alternative 2 (No Action)

- Direct and Indirect Effects

No appreciable increase in noxious weeds and/or invasive non-native plant species is expected to occur. Populations that exist now are not expected to expand but will continue to persist at background levels, thus maintaining a seed source at the site.

- Cumulative Effects

No appreciable increase in noxious weeds and/or invasive non-native plant species is expected to occur. Populations that exist now should not increase but will continue to act as a seed source. As natural disturbance events occur such as slides and trees uprooting, weeds will have an opportunity to occupy or invade but will not persist over a long period of time because of competition from native plant communities.

3.5 Soils

3.5.1 Affected Environment

Project soils are typically 20 to 60 inches thick, well-drained, and moderately permeable. Soil surface textures are ashy loam, gravelly loam, or silt loam. Soils formed in colluvium in mountainous uplands from volcanic materials. Favorable soil properties and climate result in high soil biological activity and plant growth (Site index 109 to 124 for Douglas-fir, 50 year basis). Soils in haul road cutbanks are similar except that they are commonly truncated and often have more gravels and rocks. Surficial slumps, the most common type of slope failure, commonly occur on over-steepened road cuts and are often associated with small trees falling out of the road bank.

All known sites too fragile to tolerate timber management activities without long-term loss of productivity were removed from management consideration during pre-planning and project development. Any unsuitable sites discovered through additional field work will be avoided. The project area contains a few small areas (<15 acres) with potential soil limitations with regard to harvesting and reforestation. They are shallow, very gravelly soils (FSR1) and active soil creep activity (FPR1). These sites would be managed using recommended BMPs (e.g., avoiding ground-based equipment, maintaining or re-establishing natural drainage).

Project soils are recovering from the effects of the Tillamook Burns and subsequent salvage logging. Abundant concentrations of large woody debris are scattered throughout most of the project area. Burning and logging, however, have reduced the organic duff layer from 1 to 2 inches to generally less than 1/2 inch, likely reducing the soil productivity. Logging operations have also left a legacy of compacted tractor skid roads and haul roads. Overall, it is estimated that approximately 20% of the area proposed for ground-base yarding is currently impacted by soil compaction and soil displacement.

The primary soil management concerns are compaction /displacement/mixing impacts associated with ground-base yarding and road construction. Project soils are highly susceptible to compaction. Detrimental compaction/displacement/ mixing can reduce soil productivity.

3.5.2 Environmental Effects

3.5.2.1 Alternative 1 (Proposed Action)

The affected soil analysis area encompasses all areas that would be directly affected by ground disturbing activities. Forest management effects on soils have been analyzed broadly in the RMP/FEIS (Ch. 4, 11-14). Soil impacts are expected to be within the range analyzed in the RMP/FEIS if pertinent design features and BMP's are implemented.

- Direct and Indirect Effects

Density Management Thinning –

Project soil disturbing activities which have the greatest potential to alter soil properties and lead to soil productivity losses are ground-base yarding, cable yarding and road building.

Ground-based yarding. Ground-based yarding would cover a maximum of 10% of the areal extent of each harvest unit (approximately 12 acres in total). Ground-based yarding would result in heavy compaction on landings and

portions of heavily used skid trails. Using exiting skid trails and skid roads from previous entries and subsoiling landings and some skid trails would reduce the total amount of new soil compaction/displacement to about 5% (5 to 7 acres) of the ground-based yarding treatment area.

Cable yarding. Approximately 80% of the treatment area would be cable yarded. Cable yarding would disturb about 5% (35 acres) of the harvest units, resulting in some minor gouging and compaction in narrow strips along the corridors and heavy compaction in landings. Cable yarding on up to 291 acres during the wet season would slightly increase the risk of compaction and erosion beyond that expected during the dry season.

Road Building. Most roads in the project vicinity were built on the valley margins and mid-slopes to accommodate tractor skidder logging following the Tillamook burns; very few roads were built on upper slopes or ridgetops. To access the upper mountain slopes from the lower slopes, past timber operators commonly built skid roads (bladed roadways with no engineering design work) often over steep slopes. Many of the upper hillslopes and ridgetops are lacking roads. Under the proposed action, new roads would be built to allow access to these areas for cable logging.

Constructing 11,500 feet of new roads and reconstructing 8,800 feet of existing roads would result in about 5 acres of detrimental soil disturbance- loss of topsoil and severe compaction of subsoil. Most roads would be located on gentle sloping benches and ridgetops and would require minimum excavation and fill. The main exception is a road segment in Unit 8-2 which would require approximately 300 feet of sidehill construction on a 40% to 70% hillslope.

Researchers have generally reported a consistent relationship with increasing soil compaction and decreasing conifer height growth. A soil compaction study (Powers, 1974) in the BLM Salem District found a growth reduction of 40% volume of 50 to 60 year old Douglas-firs on compacted landings and railroad beds compared to adjacent undisturbed areas. Assuming a similar loss as the Power's study, ground-based yarding would result in a long-term soil productivity loss of about 2% or the equivalent of about 2 to 3 acres. Cable yarding, not including impacted areas within roads, is expected to result in minimal soil productivity loss, about 1% (equivalent of about 4 to 7 acres).

Following project completion, all project roads newly constructed and reconstructed would be decommissioned, decreasing the road mileage by approximately 8,300 feet in the Nestucca watershed and approximately 500 feet in the Trask watershed. Decommissioning would consist of ripping the road surface, waterbarring, blocking access to all vehicle traffic including OHV's. Subsoiling would increase water infiltration and prepare a more favorable environment for plants and soil organisms. Soil productivity on these treated roads will likely remain low for decades. Natural surfaced roads with little displacement that are planted are likely to recover most quickly. The soil productivity on rocked roads and/or deeply excavated roads is likely to remain minimal for the foreseeable future.

In summary, based on the proceeding analysis, management activities are expected to result in about 52 acres of detrimental soil disturbance (compaction/displacement/mixing) or slightly less than 2% loss in long-term soil productivity for the entire project area.

- Cumulative Effects

Management practices (yarding and roads) would have a minimal additive effect upon soil productivity at the watershed scale (less than 0.05 percent loss in productivity in the Upper Nestucca Watershed). Complete recovery of soil compacted from yarding is likely to take several decades. Given the slow rate of natural recovery, if the units harvested with ground-based equipment are re-entered in less than 10 to 25 years there is a strong likelihood that there would be a cumulative effect, especially if the roads and skid trails are not reused.

Snag and CWD Creation – Wildlife Treatment Units Only –

- Direct and Indirect Effects

The proposed action would not disturb the ground surface. Felling a small number of trees would add a small amount of organic matter to the forest floor. This addition would have a slight beneficial affect on soil productivity at the site scale and immeasurable effect at the project level and watershed scale. Current soil processes and conditions would continue to occur based on current conditions. Soils impacted from prior disturbance would continue to recover their productivity through natural restoration processes.

- Cumulative Effects

Since there would be no ground disturbance, the proposed action would not have a cumulative additive effect upon soil productivity.

Haul Road Maintenance –

- Direct and Indirect Effects

The risk of soil degradation (i.e., loss in soil productivity) resulting from the implementation of the proposed action is low. Yarding small diameter trees would cause some minor soil disturbance (compaction/displacement/mixing) and slightly increase erosion on a small area in the short-term. It would also immediately reduce the risk of slumping, the most common type of road-cut slope failure in the project area. The net result would be a slight beneficial effect on soil productivity.

- Cumulative Effects

Considering the limited area of disturbance and the overall area involved, the proposed action would have a minimal cumulative additive effect upon soil productivity.

3.5.2.2 Alternative 2 (No Action)

Since no forest management activities would be implemented, there would be no additional detrimental soil effects from logging approximately 820 acres and building 11,500 feet of new roads and reconstructing 8,800 feet of existing roads. Since no measures to ameliorate compaction on existing roads would be undertaken, 8,800 feet of existing roads would continue to remain in a compacted state thereby limiting future soil productivity. On haul roads, trees on cut-banks would continue to grow larger, fall over and bring soil and rock material down into ditches and across the road beds. Current soil processes and conditions would continue to occur based on current conditions. Soils would continue to recover their native productivity through natural restoration processes until another major disturbance occurs. Cumulative effects to soils would continue from disturbances caused private and other agencies forest management activities.

- Cumulative Effects

There would be no adverse cumulative effects resulting from selecting the “No Action” alternative. Cumulative effects to s would continue from soil disturbances caused from private and state forest management activities (primarily timber harvest and road building). By not implementing the proposed action another area within the Tillamook Resource Area would be selected for density management and many if not all of the impacts associated with the Proposed Action would occur in a different area.

3.6 Special Status and SEIS Special Attention Wildlife Species and Habitat

3.6.1 Affected Environment

There are four species covered under the BLM's 6840 Special Status Species policy for which there is habitat within the project area. Two of the species, the red-legged frog and Columbia torrent salamander have been documented in or very near the project area. The other two, the fisher and northern goshawk, are unlikely to currently occur in the area, but their presence cannot be absolutely ruled out. Both the fisher and goshawk appear to be more dependent on late-seral habitat than the two amphibians. All four species are sensitive to forest fragmentation to some degree.

3.6.2 Environmental Effects

3.6.2.1 Alternative 1 (Proposed Action)

- Direct and Indirect Effects

Fisher –

Of what little is known about fishers in the Pacific states, they appear to favor unfragmented late-successional forests, favor riparian areas disproportionately more than their occurrence and tend to avoid non-forested areas. Fishers are secretive animals, primarily nocturnal and, the literature suggests that they prefer "deep forests" and "cedar swamps" containing considerable down wood. The project area contains good amounts of large down wood with opportunities for denning and resting sites, although apparently fishers regularly use large cavities in snags and may actually prefer them. The overstory is somewhat younger than that of preferred habitat, but it is dense and offers the seclusion that fishers appear to favor. In addition, the area of the proposed action is one of the least fragmented forest areas in the Nestucca drainage due to its inclusion within the Tillamook burn area.

According to Keith Aubry the last verified sighting of the fisher in Oregon occurred in 1993 in the southern Cascade Range. In the Oregon Natural Heritage Information Center database, there are 4 records of fisher sightings in Tillamook County in 1980-81, three of which were in the Nestucca watershed and 1 record for Lincoln County in 1991. Experts believe that fishers in Oregon are restricted to two populations in southern Oregon based on recent surveys, however, it appears that there were no surveys done in the north coast area of Oregon therefore it is impossible to rule out the existence of an extant population here, although it is unlikely.

Fishers are apparently sensitive to human disturbance and may move out of an area if that disturbance is too great. The implementation of the proposed action would most likely disturb fishers and may cause them to leave the area if they are in fact present. However, the proposed action is not expected to alter the habitat enough to make it unsuitable for continued use by fishers in the near term and is expected to become good fisher habitat in the longer term (>30 years). The proposed action would decommission all of the new and reconstructed roads and therefore would not increase the potential for continual disturbance from vehicle traffic.

Implementing the Snag and CWD creation in the wildlife treatment units will have a small beneficial effect to fisher habitat by introducing additional diversity to the forest which may result in additional den site possibilities and habitat for prey species. The Haul Road Maintenance project will not impact fisher habitat and would not cause intense enough disturbance to cause fishers, if present to leave the area.

Due to the possibility that the fisher is extirpated from this area and the nature of the project, coupled with design features intended to reduce negative impacts to sensitive species and resources, such as retaining and minimizing disturbance to existing CWD, decommissioning roads, and seasonal restrictions will reduce the potential for negative impacts to fishers or their habitat. The project as proposed should not result in any change in status for the fisher.

Northern Goshawk –

Goshawks are quite rare in the coast range with less than five breeding records. The nearest known breeding sites are in the central coast range in the Yachats and Siuslaw river drainages. The project area currently provides only marginal foraging habitat for goshawks due to the young stand age, high tree density, and lack of vertical structural diversity. The reduction of tree density while maintaining stand diversity would benefit the goshawk over time and consequently would not result in a trend toward changing the status of the goshawk or in loss of population viability.

Implementing the Snag and CWD creation in the wildlife treatment units will have a small beneficial effect to goshawk habitat by introducing additional diversity to the forest which may result in additional habitat for prey species and a small improvement in the hunting venue. The Haul Road Maintenance project will not impact goshawk habitat and would not cause intense enough disturbance to cause goshawks, if present to abandon the area.

Columbia Torrent Salamander –

Torrent salamanders live along the splash zone of small permanent streams. Some of these streams may only be 1-2 feet wide. The proposed action area contains many of these types of streams and Columbia torrent salamanders have been documented in Unit 5-1. These salamanders live within a narrow ecological niche and are sensitive to humidity changes within their habitat. The proposed action would maintain “no-harvest” buffers along all streams and this design feature should provide adequate protection of the riparian habitat. However there will be cases where cable yarding corridors will be cut through some “no-harvest” buffers thus impacting short stretches of the creeks. It is expected that the yarding corridors would be less than 20 feet wide and not closer than 150 from each other. In the areas cut through the buffers there will be a small increase in solar radiation hitting the stream resulting in a small amount of drying. The trees that are cut will be retained within the riparian area and may help provide shade to the open area. The resulting impacts are expected to be small, affecting probably less than 5% of the total stream buffer areas throughout the project area. The vast majority of suitable Columbia torrent salamander habitat within the project area will not be impacted therefore the proposed action is not expected to result in any change in the status of these salamanders or their population viability. Neither The Haul Road Maintenance nor the Snag and CWD Creation in Wildlife Treatment units would occur in suitable torrent salamander habitat, therefore there would be no impacts associated with those projects.

Northern Red-legged Frog –

Red-legged frogs have been documented in the proposed action area. Red-legged frogs require standing water to breed; however they are considered to be less aquatic than many other frog species and are regularly found far from water in the terrestrial uplands. One study conducted in the southern Washington Cascades found that red-legged frogs prefer forested environments with an abundance of large CWD which may offer both cover and a source of moisture that provides a more humid microclimate during dryer periods. There are very good breeding areas in the vicinity of the project units in both upper Bear and Elk Creeks. It is not expected that the density management project, haul road maintenance, or snag or CWD creation (in wildlife units only) would have an appreciable effect on red-legged frogs as a species. All of the potential breeding sites would be completely protected by either “no-harvest” buffers or by being completely outside of the project areas. There may be a small effect associated with direct impact to individuals that happen to be in the upland areas while operations are on-going; or some areas may become temporarily unsuitable for frogs where the canopy closure has been reduced to the lower levels (approximately 40%) and causes greater warming and drying than may be desirable for red-legged frogs. This effect is expected to be temporary until the tree crowns close and increase the shade level as would be expected to begin happening within 5 years. Since there would be little disturbance to the large CWD in the area, the proposed action and snag and CWD projects would introduce a small amount of new CWD, and all potential breeding sites will be protected, the short term negative impacts occurring over a portion of the harvest units, would not be

expected to result in effects to red-legged frogs that would cause any change in sensitivity status or population viability. The haul road maintenance would not occur in suitable red-legged frog habitat.

- Cumulative Effects -- Special Status and SEIS Special Attention Wildlife Species and Habitat (SSS)

Although the special status and SEIS special attention species (SSS) analyzed above all have somewhat different life history requirements, their association with unfragmented conifer forest will allow them to be grouped for cumulative effects analysis.

Generally speaking actions occurring on federal lands for the foreseeable future within the analysis area (Upper Nestucca Mixed Seral Landscape Zone and Cell) will have minor short term impacts to SSS species and will benefit these species in the long term. Density management projects of this type will affect the canopy but will allow the overall habitat to continue to function as it currently does. It is expected that future federal projects will continue to include design features that will protect riparian zones and minimize impacts to water quality and soils thus maintaining breeding habitat for Columbia torrent salamander and red-legged frog. However, State and private activities that do not retain canopy over the small stream habitat would certainly result in the loss of some torrent salamander populations.

If present, goshawks and fishers would eventually benefit from a more structurally diverse forest habitat, but may suffer from disturbance associated with project operations. However, the rate at which forested area on federal land would be impacted (approximately 1-2 % per year) coupled with the rather large home ranges and good mobility of both goshawks and fishers, it is expected that individuals of both species should be able to move away from disturbance without causing long-term negative impacts to individuals. Private lands will not provide habitat for these species but State lands may function as marginal habitat and contribute to the overall usable home range area.

3.6.2.2 Alternative 2 (No Action)

- Direct and Indirect Effects

See the Environmental Consequences section of the Forest Vegetation analysis of the “No Action” alternative (section 3.8.2.2) for a description of the expected impacts to the forest vegetation component of wildlife habitat.

Under the “No Action” alternative none of the activities described for the proposed action alternative would occur. Habitat for Special Status and SEIS Special Attention Species would be unaffected. There would not be any disturbance to riparian areas from yarding corridors; neither would there be any potential for additional drying of the terrestrial environment that may otherwise result from a thinned canopy that would affect either frogs or salamanders. The marginal habitat potential for fishers and goshawks would be maintained and in the more distant future would eventually improve but at a slower rate as compared with the rate of potential improvement that could occur with intervention. The status and population trend of these species would continue on their current trajectory.

- Cumulative Effects

The forested environment on federal lands within the analysis area would continue to age and other density management projects would be expected to continue to occur and eventually the forested area on federal lands would diversify into a more complex forest structure. None of the four species analyzed here would experience any cumulative effects in the near term as a result of not implementing this project. However, in the longer term, perhaps 20 to 30 years hence, habitat for the fisher and goshawk in the vicinity of the proposed project may be less suitable compared to the potential habitat that may exist as a result of the proposed action, due to the continued homogenous nature of the forest structure in an area of otherwise unfragmented canopy condition.

3.7 Fish Species with Bureau Status and Essential Fish Habitat

3.7.1 Affected Environment

The Pacific lamprey is a Bureau Assessment species; Oregon Coast cutthroat trout and Oregon Coast steelhead are both Federal candidates for listing under the Endangered Species Act. Oregon Coast chinook salmon and Oregon Coast coho salmon are included in the Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat) provisions. All of these species have similar habitat requirements for spawning (cool water, gravel substrates) and any changes to these habitat elements may affect spawning success. The life history of these species is quite variable, chinooks spend very limited time in the upper portions of the Nestucca Watershed or Trask Watershed while cutthroat may spend their entire life there. Pacific lamprey differ from the salmonids in that they have the longest juvenile stage (4-6 years) and rear in sediment rich portions of the streams.

Bear Creek and Elk Creek were surveyed for fish presence in 2002 and 2003; aquatic habitat conditions near the project area were excellent, with resident cutthroat trout present in the perennial portions of those streams. Elk Creek has an extensive area of fair to good cutthroat habitat upstream from the barrier falls.

Cutthroat trout have the greatest distribution of any species within the proposed action area often found in second order tributaries and many populations isolated above barriers to anadromous salmonids. Chinook salmon have the least extensive distribution, being mainly restricted to the lower portions of the larger streams. Steelhead, coho salmon and Pacific lamprey tend to occupy habitat lower in the stream system than the upper extent of cutthroat trout distribution.

3.7.2 Environmental Effects

3.7.2.1 Alternative 1 (Proposed Action)

- **Direct and Indirect Effects**

Due to the overlap in habitat use, the potential impacts to coho as discussed in section 3.2 relate to cutthroat trout, chinook salmon, steelhead and Pacific lamprey as well. Cutthroat trout, which occur adjacent to units 18-1, 7-1, 7-2 and directly downstream of most of the other units (less than 0.5 miles) have only a slightly greater chance of behavioral changes (aversion response) from the potential sediment increase from timber yarding or hauling. Since any increases in fine sediments are anticipated to be small (see water quality chapter 3.3) and the streams in the harvest areas are generally of high gradient, no functional change in cutthroat spawning or rearing habitat is anticipated. Impacts associated with the haul road maintenance activities are expected to be the same for all the species with Bureau Status, and those species within the action area covered under the Magnuson-Stevens Fishery Conservation and Management Act (coho and chinook salmon). The effects of this road maintenance are anticipated to be a reduction of sediment from road maintenance caused by leaf fall and road cut slope failure that occurs primarily during winter storms. Implementation of the snag and CWD creation in wildlife treatment units has the potential of direct effects to coho, steelhead and cutthroat trout including mortality or aversion responses where trees may fall directly into streams with occupied by these fish. The effect to habitat for these fish would be mostly beneficial by increasing structural diversity of the stream while causing only a small short term increase in localized sediment.

Cumulative Effects

Similar effects are anticipated to steelhead, chinook, cutthroat and lamprey and their habitat as was discussed in section 3.2 for coho salmon where distribution overlaps. Due to the ownership patterns and land management strategy differences between the Nestucca and Trask Watersheds the loss of CWD in headwater streams occupied by cutthroat may be noticeable in the Trask Watershed in the long term. The Nestucca and Trask Watersheds in the action area share the same fire history and post fire harvest. The difference between the watersheds and there ability

to contribute large wood to stream channels may become apparent due to the greater use of silvicultural treatments such as regeneration harvest in the Trask versus thinning to create late seral habitat in the majority of the Nestucca. The road maintenance activities are not considered to be cumulative in nature, however a small decrease in sediment input may occur in those areas to be treated. The addition of CWD and snag creation is not anticipated to have any effects that are cumulative relative to other actions in the area.

3.7.2.2 Alternative 2 (No Action)

- **Direct and Indirect Effects**

No action would occur under this Alternative; therefore no direct or indirect effects would occur to coho or coho habitat. Adverse impacts from sediment related to timber harvest or hauling, and the loss of potential CWD would be avoided. Foregoing haul road maintenance could have some impact on individual fish or habitat. Without the roadside treatment of trees from the cut or fill slopes there is the potential of increased sediment inputs due to these trees falling over. These trees are most likely to fall during the winter because of high soil moisture levels, high winds, and accumulations of snow and ice. The result is likely to be an increase in soil movement into roadside ditches and an increase in road maintenance activities that can result in sediment delivery to streams.

- **Cumulative Effects**

Under the no action alternative there are no effects that would be cumulative to the other actions within the analysis area.

3.8 Forest Vegetation (Associated with Late-Successional Reserves and Riparian Reserves)

3.8.1 Affected Environment

Overstory and understory stand conditions –

According to the stand exam data collected in 2003, the majority of the proposed density management thinning area supports relatively dense Douglas-fir or mixed Douglas-fir/western hemlock stands ranging in age from about 30 to 55 years old. The stands originated following the Tillamook Burn or following clearcut harvest. A large percentage of the Douglas-fir in these stands was either planted or seeded. The western hemlock and hardwoods most likely regenerated naturally. There is considerable variation in the relative proportions of Douglas-fir and western hemlock among the stands. Hardwoods, particularly red alder, occur in varying proportions within the proposed units and are most common in riparian areas or are associated with areas that have been disturbed in the past, such as old skid roads, road edges, and landings. The majority of the stands appear to have been pre-commercially thinned. Because of the relatively dense overstory canopies, the amount of light reaching the forest floor is generally limited, which restricts understory development. Where there is sufficient light reaching the forest floor, the most abundant understory shrub species include vine maple, swordfern, Oregon oxalis, salmonberry, salal, and dwarf Oregon grape. Western hemlock appears to be the most consistent and abundant understory tree species.

Overstory tree densities range from about 150 to 270 trees per acre. The overall average overstory canopy closure is just over 80%. There is considerable variation in the number of understory trees (just over 10 to nearly 155 trees per acre) and the species composition of the understory among the stands.

The overall overstory quadratic mean diameters for the stands range from nearly 11 to just over 15 inches, the mean live crown ratios vary from about 40 to over 55%, and the relative density index values (indices to the level of competition among the trees within a stand) range from about 52 to 74%, with over 80% of the stands having relative density index values above 55%. Above relative density index 55%, Douglas-fir stand growth and vigor

declines and mortality of the smaller-sized trees begins because of strong tree-to-tree competition for the available site resources. In addition, all of the stands have height:diameter ratios of over 80 when calculated from the quadratic mean diameter for the overstory Douglas-fir stand component and the height of the 40 largest trees per acre. The height:diameter ratio is an index to stand stability. Stability for several conifer species decreases because of increased susceptibility to damage from wind and snow above a height:diameter ratio of about 80 (Wonn and O'Hara).

Forest Health –

There are no major threats to forest health in the portion of the area proposed for density management thinning. Laminated root rot, caused by the fungus *Phellinus weirii*, is a native root pathogen that probably affects about 5 percent of the area on the average. Units 7-2, 8-3, and 10-2, however, contain some fairly large *P. weirii* infection centers. Douglas fir is highly susceptible to *P. weirii*, (it is readily infected and killed by it); western hemlock is intermediately susceptible; western redcedar is tolerant or resistant; and all hardwoods are immune (Hadfield et al. 1986). In unit 8-3, the disease severity is such that even western hemlock is being infected and killed in some cases. *P. weirii* kills trees directly or makes them prone to windthrow because the disease decays their root systems. Tree-to-tree spread is through root contacts with infected trees or stumps (Hadfield et al. 1986). Disease centers are believed to expand radially at the rate of about one foot per year (Nelson and Hartman 1975). *P. weirii* attacks susceptible hosts regardless of tree size, age, or vigor. Tree killing by *P. weirii* can create openings in the canopy where shrubs, hardwoods, or shade- and disease-tolerant conifer species may occupy these various-sized gaps (Thies and Sturrock 1995). Because infected trees are windthrown or die standing, the disease can be a source of down wood and snags. Most disease centers appear to be less than ¼-acre size and appear to be increasing the level of diversity within the stands.

Fresh down Douglas-fir trees encourage the build-up of Douglas-fir beetle populations, which subsequently attack and kill Douglas-fir trees. Douglas-fir trees weakened by root disease infection are more likely to be attacked by the Douglas-fir beetle (Hadfield 1985). When the number of windthrown Douglas-fir trees greater than 12 inches in diameter is three or more per acre, the number of beetles produced is sufficient to cause infestation and mortality of standing live Douglas-fir trees (Hostetler and Ross 1996). Based on past windthrow events, they estimate that the number of live standing trees infested and killed by Douglas-fir beetles will be approximately 60% of the number of infested down trees. Observed Douglas-fir mortality attributable to Douglas-fir beetle attack as a result of leaving Douglas-fir logs greater than 12 inches in diameter on site for coarse wood treatment in two project areas in and around the Nestucca watershed, however, was much less than expected.

Swiss needle cast disease was observed on Douglas-fir in these stands. Affected trees appear chlorotic, lose older foliage prematurely, and commonly demonstrate progressive diameter and height growth loss (Filip et al. 2000). Disease severity level tends to vary within the stands, with trees showing the greatest symptoms occurring on ridgetops and southern exposures. Overall, the level of Swiss needle cast disease appeared to range from low (2.6 to 3.5 years of foliage retained) to moderate (1.6 to 2.5 years of foliage retained). Relatively light thinning (density management) and retention of non-Douglas-fir species is a recommended silvicultural treatment for such stands (Filip et al. 2000).

Annosus root disease, caused by *Heterobasidion annosum*, may result in substantial butt decay in western hemlock that is over 150 years old, and mortality resulting from stem breakage (Buckland et al. 1949, Foster et al. 1954). Spores of the fungus colonize freshly exposed wood on stump surfaces and stem wounds, and then the disease spreads to adjacent healthy trees most commonly by root contacts (Hadfield et al. 1986). Although the rate of disease infection was nearly twice as high in commercially thinned 40- to 120-year-old western hemlock stands in western Oregon and Washington compared to unthinned stands, losses due to decay were very low (Goheen et al. 1980).

There is some risk of windthrow from severe winter storms, or to some extent, wildfire. Following partial cut harvest, the potential for windthrow would be greater for the next decade (generally the first few years following thinning). The upper lee slopes of major southeast to northwest running ridges generally experience the highest degree of windthrow in the Oregon Coast Range (Ruth and Yoder 1953).

Coarse Wood –

In general, the total coarse wood volume for the units is relatively high, but the vast majority occurs in the more advanced decay classes. There is considerable variation in the amount of down wood, snags, and total coarse wood volume among the units. As an overall average weighted by acres, there are over 3,200 cubic feet per acre of total coarse wood in the proposed treatment units, according to the forest survey data collected in 2003. This level of total coarse wood falls within the high range (1,980 to 3,800 cubic feet per acre for Oregon Coast Range stands 25 to 49 years old and 1,980 to 4,840 cubic feet per acre for stands 50 to 79 years old), according to the Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area (USDA Forest Service and USDI Bureau of Land Management 1998). Approximately 98% of the total coarse wood volume, however, is from down wood, and only 2% is from snags. About 5% of the down wood volume is in decay classes 1, 2, and 3, and about 95% is in decay classes 4 and 5. The source for much of the relatively large-diameter, more advanced decay class down wood appears to be old-growth snags that were felled for fire prevention following the Tillamook burn. The majority of the more recent decay class down wood seems to be smaller trees that have died as a result of suppression and windthrown Douglas-fir trees, with some occurring as a result of *P. weirii* root rot infection. The total weighted average volume of down wood is just over 3,100 cubic feet per acre.

There is a weighted average of nearly 6 conifer snags per acre that average just over 11 inches dbh and about 46 feet in height. Approximately 99% of the snags are in decay classes 1, 2, and 3 and many appear to be smaller-sized Douglas-fir trees that have died as a result of suppression. Some snags have been created as a result of root disease infection. About 1% of the snags are in decay classes 4 and 5. The total weighted average snag volume is only about 100 cubic feet per acre.

Trend –

The density of the stands will continue to increase and reach to relatively high levels over the next 20 years without thinning. Development toward late-successional forest conditions in these stands is expected to continue to slow unless some form of disturbance occurs that creates openings in the stand type groups to permit accelerated growth of some overstory trees and provides an opportunity for understory trees, shrubs, and herbs to increase their rates of growth. In addition, the stands generally are expected to remain relative unstable, and therefore, susceptible to wind and snow damage as indicated by relatively high height:diameter ratios.

3.8.2 Environmental Effects

3.8.2.1 Alternative 1 (Proposed Action)

- Direct and indirect effects

Density management treatment on the upland sites and in the Riparian Reserves will help to promote the development of larger blocks of stands with older forest conditions while minimizing short-term effects on habitat quality. Implementation of the proposed thinning treatment also represents an opportunity to increase the resiliency of the stands to the impacts of Swiss needle cast disease on Douglas-fir by encouraging mixed-species stands where possible and retaining the most disease-tolerant-appearing Douglas-fir.

The proposed thinning will remove approximately 50 to 70% of the overstory trees (30 to 50% of the basal area) per acre. Thinning will remove primarily the smaller trees in the stands. The proposed residual number of trees per

acre ranges from about 59 to nearly 106 trees per acre. Immediately after thinning, the overstory canopy closure is expected to average between 40-60%, but is not expected to fall below 40%. Based on the increase in relative density index over time, these stands should be evaluated for additional thinning treatments 20 years or so after treatment to further the development of certain older-forest stand characteristics.

As a result of thinning, the average stand diameters are expected to increase, crown ratios and limb development of the residual overstory trees should increase, growth of understory trees, shrubs, and herbs should be stimulated, windfirmness and stability (indicated by reduced height:diameter ratios) of the residual trees would increase, mortality of the smaller-sized trees would decrease (little competition-related mortality is expected for at least the next 20 years following thinning). By thinning in a variable-spaced manner, some trees would be given more room to grow and others would be given less. This should increase overstory canopy heterogeneity and result in a more uneven pattern of understory development. By encouraging mixed-species stands and retention of Douglas-fir trees that demonstrate a relatively greater degree of tolerance to Swiss needle cast, the stands should be more resilient to the affects of this disease. In the long term (>30 years) the larger-sized trees would result in higher quality down logs and snags as the trees eventually die or are converted to snags or down logs through planned management actions.

Table 3 shows the range of estimated changes in overstory stand characteristics from the current condition to the condition immediately after thinning and to the condition 20 years after thinning for the stands proposed for density management thinning.

Table 3.

Overstory stand characteristic	Approximate range		
	Current condition	Immediately after thinning	20 years after thinning
Trees per acre	139 – 271	59 – 106	59 – 105
Basal area per acre (sq ft)	151 – 228	100 – 140	196 – 221
Quadratic mean diameter (in.)	10 – 15	13 – 20	19 – 26
Relative density index (%) ¹	52 – 74	32 – 38	52 – 58
Live crown ratio (%)	39 – 56	46 – 62	36 – 46
Height:diameter ratio	81 – 95	70 – 79	65 – 81

¹Percentage of maximum Stand Density Index (Reineke 1933).

After 20 years, the estimated increase in the Douglas-fir quadratic mean diameter as a result of density management thinning (thinned stands compared to unthinned stands after 20 years) as predicted by ORGANON (Hann et al. 1997) ranges from 26 to 45%. The estimated increase in mean tree volume from thinning, however, ranges from 71 to 134%.

Bailey and Tappeiner (1998) compared the effects of thinning in 40- to 100-year-old Douglas-fir stands in the Coast and Cascade ranges of western Oregon. Thinned stands had higher tree seedling density and frequency, understory tree density, tall shrub density and frequency, and low shrub cover (%) than unthinned stands. Thinned stands were also similar to old-growth stands in tree seedling density and frequency, understory tree density, and density of tall shrubs. They concluded that the findings in their study were strong evidence that thinning, even when done primarily to manage overstory/crop tree spacing (thinnings done for commercial wood production), promotes tree regeneration, shrub growth, and multi-storied stand development. They further concluded treatments designed to purposely incorporate retention of legacy structures such as large remnant trees, snags, and down wood, and/or retention of overstory hardwoods would further accelerate the development of old-growth characteristics. Canopy disturbances that thinned the canopy periodically were noted during the development of an old-growth Douglas-fir stand in the western Cascade Range in southern Washington (Winter et al. 2002). One drawback of density management thinning, however, is that it generally removes the smaller-sized trees, thus short-circuiting the snag

development process that results from tree-tree competition (Carey 1991).

The proposed 150-acre snag and coarse woody debris (CWD) creation treatment is expected to provide a slight short-term (probably 10 years or less) increase the structural diversity of stands in the vicinity of the proposed density management thinning. The overstory trees adjacent to those selected to create CWD will temporarily increase their growth rates and crown size. Where groups of trees are selected for CWD creation around groups of existing suppressed understory shade-tolerant conifer trees, these trees should exhibit a growth response because of the increased amount of light reaching the forest floor, and therefore, increase the amount of vertical canopy heterogeneity. Down logs added to the sites will eventually decay and provide a seedbed for additional regeneration of shade-tolerant conifers, particularly, western hemlock. Because the number of trees per acres is so small, little, if any, additional Douglas-fir mortality is anticipated as a result of attack by the Douglas-fir beetle.

The anticipated effects of the proposed cutting of selected 15- to 30-year-old mostly hardwood trees along Elk Creek, Bear Creek, and Bear Ridge roads would be some short-term small openings where individual trees were removed. These small openings are expected to close relatively quickly. Studies of riparian underplanting in hardwood-dominated stands are indicating that the crowns of neighboring trees expand rapidly in response to increased growing space made available through thinning. After the first year, it is expected that the crowns will close at the rate of about 8% per year on the average.

- Cumulative effects

The Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area identified the proposed project area as part of the Upper Nestucca (Core) Mixed-Seral landscape cell and zone (USDA Forest Service and USDI Bureau of Land Management 1998). The size of this area is approximately 48,000 acres. The management goals for the Core landscape zone are: (1) minimize fragmentation—provide large, contiguous areas of late-successional habitat to maximize interior forest habitat; and (2) increase connectivity and dispersal habitat within the large interior habitat blocks and develop late-seral habitat in Mixed-Seral areas next to large interior blocks. The overall management goals for Mixed-Seral landscape cells located in the Core landscape zone (includes management goals for the Late-Seral landscape cells) are: (1) "grow out" from adjacent large blocks of late-seral forest in the Late-Seral landscape cells; (2) create new and enlarge existing patches of late-seral forest within the zone (follow sub-series environment successional pathways in prescribing treatments); and 3) identify Key Watersheds and anadromous fish "core areas" needing restoration and apply silvicultural treatments that have a high degree of certainty of success and will accelerate the development of late-successional habitat.

The Bureau of Land Management manages the great majority (approximately 80%) of the land within Upper Nestucca (Core) Mixed-Seral landscape cell and zone. The remainder of the land ownership is about equally divided between the Siuslaw National Forest, private industrial forest, Oregon Department of Forestry and "other" according the Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area (USDA Forest Service and USDI Bureau of Land Management 1998). The seral stage distribution of the stands in the Mixed-Seral landscape cell and zone consists of an aggregated pattern of stands ranging from the pioneer (0 to 11 years) seral stage through the late (=80 years) seral stage according to data contained in the Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area (USDA Forest Service and USDI Bureau of Land Management 1998). The highest concentration of stands in the early (25 to 49 years) and mid (50 to 70 years) seral stages appears to be in the northern portion of the cell and zone, which is the general location of the proposed project.

It is expected that lands managed by the Bureau of Land Management, Siuslaw National Forest, and Oregon Department of Forestry in this landscape cell and zone will be managed to have a continuous canopy through density management thinning to various degrees. It is possible, however, that some of the Douglas-fir stands thinned or planned for thinning by the Oregon State Department of Forestry may be clearcut if excessive impacts from Swiss occur or are anticipated. This is most likely in the western portion of the landscape cell and zone where

the potential hazard from Swiss needle cast is higher. It can be reasonable assumed that merchantable Douglas-fir stands managed by private industry infected with Swiss needle cast will be clearcut and reforested with non-host species. Most privately-owned forest land is general clearcut before the stands reach 50 years of age. This trend in management among the various land owners is anticipated to continue for the foreseeable future.

This proposed density management thinning (approximately 820 acres) and a recently sold thinning (approximately 450 acres) on Bureau of Land Management lands together with the thinnings done and proposed to be done by the Oregon Department of Forestry on their ownership within the general vicinity, will help put the treated stands on a trajectory to acquire some older-forest characteristics (larger-diameter trees with larger crowns—some of which could be used as a source of larger down logs and snags in the future, and release and/or establishment of understory trees and shrubs) at a faster rate than without thinning, and therefore, more quickly create larger blocks of forest with older-forest characteristics. However, since thinnings generally remove the smaller-sized trees in the stand that would normally have died as a result of competition, the production of smaller-sized snags and down wood would be very much reduced for at least 20 years following thinning. As a result of implementing this proposed density management project, approximately an additional 2% of the area within this landscape zone and cell is expected to be on a trajectory to develop some late-seral forest characteristics at an accelerated rate over the 20-year period following treatment.

The anticipated cumulative impacts of implementing the proposed snag and CWD creation treatment should be a slight short-term (probably 10 years or less) increase the structural diversity of the treated stands. This treatment is expected to affect only about 0.3% of the area within this landscape zone and cell.

There should be no discernable cumulative impacts as a result of removing the selected 15- to 30-year-old mostly hardwood trees along Elk Creek, Bear Creek, and Bear Ridge roads because of the very small size of the actual treatment area.

3.8.2.2 Alternative 2 (No Action)

- Direct and indirect effects

Without thinning treatment at this time, the development of many late-successional forest structural features would occur at a much slower rate because the overstory is becoming increasingly dense and uniform, and the Douglas-fir trees in the stands would be more susceptible to the impacts of Swiss needle cast disease. According to stand development projections using the ORGANON growth and yield model (Hann et al. 1997), the relative density index of the majority of the stands will continue to increase to very high levels over the next 20 years without thinning. Under increasingly high levels of competition, crown development (live crown ratio, crown expansion, and branch growth) will decrease, diameter growth rate can be expected to decline, competition-related mortality will increase resulting in coarse woody debris additions mainly from the smaller-diameter trees that slowly die from suppression (except in areas where *P. weirii* infection has resulted in windthrow of larger-sized Douglas-fir trees), and understory development will be limited. In addition, the stands generally are expected to remain relative unstable because of susceptibility to wind and snow damage as indicated by height:diameter ratios over 80.

Table 4 shows the range of estimated changes in overstory stand characteristics from the current condition to the condition 20 years from present without thinning for the stands proposed for density management thinning.

Table 4.

Overstory stand characteristic	Approximate range	
	Current condition	20 years from present without thinning
Trees per acre	139 – 271	142 – 245

Basal area per acre (sq ft)	151 – 228	261 – 325
Quadratic mean diameter (in.)	11 – 15	15 – 19
Relative density index (%) ¹	52 – 74	72 – 95
Live crown ratio (%)	39 – 56	25 – 37
Height:diameter ratio	81 – 95	79 – 105

¹Percentage of maximum Stand Density Index (Reineke 1933).

Without implementing the proposed snag and CWD treatment, the stands in the vicinity of the density management should remain somewhat less structurally diverse for the next 20 years or so because of the lack of individual overstory trees and groups of shade-tolerant understory conifers being released, and a slightly reduced amount of future shade-tolerant regeneration without the addition of conifer logs to the sites.

There should be few, if any, impacts from not removing the proposed 15- to 30-year-old mostly hardwood trees along Elk Creek, Bear Creek, and Bear Ridge roads. Natural mortality as a result of tree-to-tree competition in some of the areas where the roadside stands are relatively dense and toppling of some larger-sized trees growing on the cut banks may occur. Trees growing in dense stands tend to be susceptible to breakage from ice and snow, and can more easily be windthrown.

- Cumulative effects

As noted in the cumulative effects section for the proposed action (section 3.FV.2.1), the proposed project area is within the Upper Nestucca (Core) Mixed-Seral landscape cell and zone (USDA Forest Service and USDI Bureau of Land Management 1998). Under the “No Action” alternative, approximately 2% of this 48,000-acre analysis area is expected to make little, if any, notable progress toward acquiring late-seral forest structural characteristics.

The cumulative effects of not implementing the snag creation and CWD treatment should be quite small because the treatment only involves creating two snags and one down log per acre and the proposed treatment only involves about 0.3% of the 48,000-acre analysis area. The untreated area should remain somewhat less structurally diverse for at least the next 20 years or so.

There should be no discernable cumulative impacts from not removing the selected 15- to 30-year-old mostly trees along Elk Creek, Bear Creek, and Bear Ridge roads because of the very small size of the actual treatment area.

3.9 Mitigation

There were three measures identified that could be applied to mitigate some of the potential negative impacts disclosed in Chapter 3 for Alternative 1 (Proposed Action). The following are the impacts on the environment which remain after application of the mitigation measure.

3.9.1 No New Roads

In a December 19, 2002 letter from the Oregon Natural Resources Council concerning the ReBear Density Management Project, it was suggested that when planning a thinning project within the LSR land use allocation that “no new road construction be a top priority”. This letter cited concerns that road construction results in an “increase of compacted soils that is not compatible with the LSR restoration objective.” The “No New Roads” mitigation was specifically developed to address this concern.

Under this measure, all activities identified in Alternative 1 would be carried out by the use of currently existing surfaced and unsurfaced roads. The implementation of this mitigation measure would result in deferring

approximately 300 acres of density management thinning resulting in a thinning area of 520 acres in size. In all other respects the design features of Alternative 1 would apply.

3.9.1.1 Threatened or Endangered Wildlife Species, Habitat and/or Designated Critical Habitat

3.9.1.1.1 Environmental Effects:

The potential impacts to species listed under the ESA by the implementation of this mitigation measure would be the same as those identified and analyzed under the proposed action alternative but would be at a reduced scale. Fewer acres would be thinned, fewer snags would be created, and fewer acres of unsurveyed suitable spotted owl and marbled murrelet habitat would be disturbed.

The following table compares the amount of suitable marbled murrelet and spotted owl habitat that could potentially be disturbed by the proposed action versus the “no new roads” mitigation measure.

Table 5

Acres Disturbed By Activities in Harvest Units	
Proposed Action	No New Roads Mitigation
122 acres	95 acres

The area of potential disturbance caused by hauling and other road work activities, including the removal of hardwoods along haul routes for road maintenance purposes, outside of the unit areas would not be reduced but the duration and frequency of that potential disturbance would be less.

Since all of the new roads that would be constructed under the proposed action would be decommissioned upon completion of the project, and road width would be kept as narrow as possible, there would not be any concern for fragmentation of spotted owl or marbled murrelet habitat.

3.9.1.2 Threatened or Endangered Fish Species or Habitat

3.9.1.2.1 Environmental Effects:

If this mitigation measure is employed the number of acres treated would be reduced by approximately 36%. The potential impacts to coho or their habitat would be similar in nature to those discussed in section 3.2 and the Biological Evaluation, but reduced proportionately to the reduction in acres treated.

3.9.1.3 Water Quality

3.9.1.3.1 Environmental Effects:

This action is unlikely to measurably alter any of the effects to watershed hydrology, channel morphology, and water quality from the proposed action. While it would retain 4.2 acres in a forested condition that would otherwise be severely impacted, it would have little affect on runoff since the roads removed from the proposed action are mostly on gently sloping benches and ridgetops away from drainage channels. None of the roads are hydrologically connected to streams. Since there would be less ground disturbance and less hauling, this action would slightly decrease the sediment delivered to streams.

3.9.1.4 Invasive, Nonnative Species (Executive Order 13112)

3.9.1.4.1 Environmental Effects:

This measure would not result in any increase of yarding roads and would reduce the amount of potential habitat that could be invaded by noxious/ invasive weed species by approximately 5 acres. All other ground disturbing activities would be affected as previously described in Density Management Thinning.

3.9.1.5 Soils

3.9.1.5.1 Environmental Effects:

The mitigation would remove all new road construction (approximately 11,500 feet) and reduce the size of the treatment area by about 300 acres from the propose action. Proposed mitigation would reduce the amount of detrimental soil disturbance by about 21.5 acres and loss in long-term soil productivity equivalent to 8.5 acres (See Table 1 below).

Table 6. Soil impact comparison.

	Proposed Action (acres)	No New Roads (acres)	Reduction (acres)
Density management treatment area	820	520	300
Disturbance from logging	41	24	17
Disturbance from roads	5 (New and Existing)	0.5 (Existing only)	4.5
<i>Total detrimental soil disturbance</i>	46	24.5	21.5
Loss in soil productivity from logging	9.5	5.5	4
Loss in soil productivity from roads	5	0.5	4.5
<i>Total loss in long-term soil productivity</i>	14.5	6	8.5
<i>Percent loss in long-term soil productivity per area treated</i>	1.8%	1.2%	0.6%

This action would help reduce the amount of predicted soil impacts resulting from the proposed action.

3.9.1.6 Special Status and SEIS Special Attention Wildlife Species and Habitat

3.9.1.6.1 Environmental Effects:

The potential impacts to special status and SEIS special attention species caused by the implementation of the “no new roads” measure would be of the same type as those analyzed in Alternative 1 (Proposed Action) but would be at a reduced level. The area impacted would be approximately 37% less which in turn would result in a shorter duration of disturbance type impacts. The action would not result in any change in status for any of the species analyzed.

3.9.1.7 Fish Species with Bureau Status and Essential Fish Habitat

3.9.1.7.1 Environmental Effects:

If this mitigation measure is employed the number of acres treated would be reduced by approximately 36%. The potential impacts to coho or their habitat would be similar in nature to those discussed in section 3.2 and the Biological Evaluation, but reduced proportionately to the reduction in acres treated.

3.9.1.8 Forest Vegetation (Associated with Late-Successional Reserves and Riparian Reserves)

3.9.1.8.1 Environmental Effects:

The direct and indirect effects, and cumulative effects on forest vegetation associated with Late-Successional Reserves and Riparian Reserves from not constructing any new roads should be the same as for the Proposed Action except that the area receiving density management thinning would be reduced to about 520 acres. Therefore, as a result of implementing this mitigation, about 1% of the area within the the Upper Nestucca (Core) Mixed-Seral landscape cell and zone (USDA Forest Service and USDI Bureau of Land Management 1998) is expected to be on a trajectory to develop some late-seral forest characteristics at an accelerated rate over the 20-year period following treatment.

For the proposed snag and CWD treatment, and the cutting of selected hardwood trees along designated roads, the direct and indirect effects, and cumulative effects on forest vegetation associated with Late-Successional Reserves and Riparian Reserves from not constructing any new roads should be the same as for the Proposed Action.

3.9.2 Mitigation – Additional Road Decommissioning

This mitigation measure would entail the subsoiling of an additional 3300 feet of existing surfaced or unsurfaced roads, that were originally constructed in the 1950's and 60's, within density management units that would not be used to facilitate implementation of the proposed action. This mitigation is intended to help offset potential negative impacts to soil and hydrological resources resulting from compaction associated with ground-based skid trails in harvest units that cannot otherwise be ameliorated at the site without unacceptable adverse impacts to other forest resources. This mitigation measure would be considered a type of "off site" mitigation and would be implemented as funding allows.

The only Environmental Elements found in Appendix 2 that have the potential of being impacted, either negatively or positively, by the implementation of this mitigation measure are: 1) Water Quality, 2) Invasive, Nonnative species, and 3) Soils. Only these three elements of the environment will be discussed below.

3.9.2.1 Water Quality

3.9.2.1.1 Environmental Effects:

Road decommissioning of the additional roads would decrease soil compaction, increasing infiltration of water, and decreasing water runoff on 3,300 feet of roads (1.5 acres). Sediment delivery to streams is unlikely. This action is unlikely to change the current condition of the aquatic system.

3.9.2.2 Invasive, Nonnative Species (Executive Order 13112)

3.9.2.2.1 Environmental Effects:

This mitigation measure would result in an additional 1.5 acres of disturbed ground that could be conducive to invasion by noxious, nonnative species, especially if a seed source is available. Project design features requiring seeding or planting disturbed areas with native species would allow natural plant succession to occur therefore reducing the available habitat for non-native species to invade. In time, non-native species are expected to return to low levels as native vegetation becomes re-established and crown closure reduces available light to the under-story.

3.9.2.3 Soils

3.9.2.3.1 Environmental Effects:

The decommissioning of 3,300 feet of additional legacy roads would help compensate for some of the predicted soil impacts resulting from the proposed action. Subsoiling these roads would reduce compaction and prepare a more favorable environment for plants and soil organisms on approximately 1.5 acres. The productivity of the soils would increase in time.

3.9.3 Mitigation – Restrict Use of Rubber Tired Skidders

Under this mitigation measure the use of rubber tired skidders would not be allowed in order to reduce the potential compaction associated with ground-based yarding equipment.

The only Environmental Element found in Appendix 2 that has the potential of being impacted, either negatively or positively, by the implementation of this mitigation measure is Soils, therefore only that element of the environment will be discussed below.

3.9.3.1 Soils

3.9.3.1.1 Environmental Effects:

Rubber-tired skidders typically cause more adverse soil impacts than other types of skidding equipment, especially on slopes greater than 15%, uphill skidding, on soils prone to compaction, and under moist soil conditions. They commonly cause more soil compaction than other skidding machines. A typical rubber tired skidder puts double the amount of pressure on the soil as that of a crawler tractor. A study in northern California (Miles, 1981) noted bulk density increases from the use of rubber-tired skidders of 5% for dry soil and 15% for moist soil over that caused by tracked machines. The use of rubber-tired skidders commonly causes more soil rutting and ground disturbance (especially on slopes greater than 20%) than other types of skidding equipment. A study in southeastern British Columbia (Hammond, 1984) found that rubber-tire skidders caused 20 to 30% greater soil disturbance on slopes less than 20% and with other machines on slopes greater than 20% than the use of crawler tractors.

Given the site conditions in the project area (shallow litter depths, high soil compaction hazard, and roughly 25% of the ground-base harvest units have slopes greater than 15%), avoiding the use rubber-tire skidders would reduce detrimental soil compaction/ displacement/ mixing. The amount of the decrease would vary with the amount of area treated; operator's skill and understanding of desired results, kind of equipment used, and soil moisture conditions.

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CHAPTER 4.0 LIST OF PREPARERS

The following individuals were members of the interdisciplinary team or were consulted in the preparation of this environmental assessment:

Andy Pampush	Interdisciplinary Team Leader / Wildlife Biologist
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Carl Symons	Transportation / Engineering
Tim Livengood	Engineering
Amy Herburger	Engineering
Kurt Heckerath	Botany
Kent Mortensen	Fuels
Kami Ellingson	Hydrology
Matt Walker	Fisheries
Carolina Hooper	Logging Systems / Planning
Walt Kastner	Silviculture
Bob McDonald	GIS / Soils
Katrina Symons	Cultural Resources / NEPA
John Casteel	Fisheries

CHAPTER 5.0 PUBLIC INVOLVEMENT AND CONSULTATION

5.1 Public Scoping and Notification

5.1.1 Tribal Governments, Adjacent Landowners, General Public, and State, County and Local Government Offices

In compliance with the National Environmental Policy Act (NEPA), the proposed action was listed in the March and October 2003 editions of the quarterly *Salem District Project Update* which was mailed to over 1,000 addresses, as well as a letter containing a scoping report for this project mailed on July 11, 2003 to 111 potentially affected and/or interested individuals, groups, and agencies. There were no letters or comments received as a result of this scoping effort.

5.1.2 30-day Public Comment Period

The EA and preliminary Finding of No Significant Impact (FONSI) will be made available for a 30-day public review period on February 4, 2004. Notification of the comment period will include: the publication of a legal notice in the *Headlight Herald* newspaper of Tillamook, Oregon, a letter to be mailed to those individuals, organizations, and agencies that have requested to be involved in the environmental planning and decision making processes; and posting on the Internet at <http://www.or.blm.gov/salem/html/planning/index.htm> under Environmental Assessments. Comments received in the Tillamook Resource Area Office, 4610 Third Street, Tillamook, Oregon 97141, on or before the end of the 30-day comment period will be considered in making the final decision for this project.

5.2 Consultation

5.2.1 United States Fish and Wildlife Service

The spotted owl will be affected by this project in two ways; through modification of dispersal and critical habitat and through disturbance during the critical and noncritical breeding season. The potential impacts, through dispersal and critical habitat modification and/or disturbance during the critical breeding season are substantial enough to warrant formal consultation. The potential impacts to marbled murrelets due to the potential for disturbance during the critical part of the breeding season are substantial enough to also warrant formal consultation. The potential impacts to bald eagles due to the potential for disturbance during foraging activities are substantial enough to warrant informal consultation.

In accordance with regulations pursuant to Section 7 of the Endangered Species Act of 1973, as amended, formal and informal consultation concerning the potential impacts of the proposed Southern Flame projects (two separate timber sales, haul road maintenance and snag and CWD creation in wildlife treatment units) upon the spotted owl, marbled murrelet and bald eagle would be completed where appropriate. This would be accomplished by including the projects in the "Habitat Modification" or "Disturbance" Biological Assessments (as appropriate) prepared by the interagency Level 1 Team (terrestrial subgroup) for the North Coast Province. It is our current intent that the first timber sale would be offered for sale in FY 2005 and the second in FY 2006. It is expected that both of the projects would be included in the Biological Assessments which are currently in process and would analyze FY 2005 and FY 2006 projects. If for some reason either or both of the Southern Flame timber sales or other projects are postponed until beyond FY 2006, then they would be resubmitted for inclusion in the next appropriate programmatic consultations. The proposed projects would not be implemented until consultation is completed and would incorporate the appropriate Terms and Conditions of the corresponding Biological Opinion (BO).

5.2.2 NOAA Fisheries (National Marine Fisheries Service)

In accordance with regulations pursuant to Section 7 of the Endangered Species Act of 1973, as amended, consultation concerning the potential impacts of the density management thinning and haul road maintenance upon the Oregon Coast coho salmon would be completed, where appropriate, prior to project implementation. Concurrent consultation would also occur for the Essential Fish Habitat for Chinook and coho salmon pursuant to the Magnuson-Stevens Fishery Conservation and Management Act. These projects would not be implemented until consultation is complete and would incorporate additional design features as required by NOAA Fisheries.

Endangered Species Act Section 7 consultation and Magnuson-Stevens Fisheries Conservation and Management Act Essential Fish Habitat consultation has been completed for the snag and CWD creation project (programmatic Biological Opinion, dated February 25, 2003, that is applicable through Fiscal Year 2007).

APPENDIX 1

ALTERNATIVE DEVELOPMENT SUMMARY

Environmental Assessment Number OR-086-04-01

Pursuant to Section 102 (2) (E) of NEPA (National Environmental Policy Act of 1969, as amended), Federal agencies shall “Study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.” The CEQ (Council on Environmental Quality) regulations for implementing the procedural provisions of NEPA states, alternatives should be “reasonable” and “provide a clear basis for choice” (40 CFR 1502.14).

In light of the direction contained in both NEPA and the CEQ Regulations, the following questions were used to 1/ identify the alternatives to be analyzed in detail in this environmental assessment that are in addition to the “proposed action” and “no action” alternatives, and 2/ document the rationale for eliminating alternatives from detailed study.

1. **Are there any unresolved conflicts concerning alternative uses of available resources?** *If yes, document and go to Question #2. If no, document rationale and stop evaluation.* No, there are no unresolved conflicts. A scoping report was sent to 111 addresses including regulatory agency representatives, forestry and wood products representatives, members of the environmental community, local governments, State agencies, Tribal governments, adjacent landowners and members of the public that have expressed an interest in these types of projects in the past. As a result of this scoping effort, the BLM did not receive any comments. Since no comments were received the Interdisciplinary team analyzed only the Proposed Action and the No Action alternatives in the Environmental Assessment document.
2. **What alternatives should be considered that would lessen or eliminate the “unresolved conflicts concerning alternative uses of available resources”?** *List alternatives and go to Question #3. If no alternative is identified other than the “no action” alternative, document and stop evaluation.*
3. **Of those alternatives identified in Question #2, are there reasonable alternatives for wholly or partially satisfying the need for the proposed action?** *If so, briefly describe alternatives and go to question #4. If no, document rationale and stop evaluation.*
4. **Of those alternatives identified in Question #3, will such alternatives have meaningful differences in environmental effects?** *If so, seek line officer approval to carry alternatives forward for detailed analysis in the environmental assessment. If no, document rationale and stop evaluation.*

APPENDIX 2 ENVIRONMENTAL ELEMENTS

Environmental Assessment Number OR-086-04-01

In accordance with law, regulation, executive order and policy, the interdisciplinary team reviewed the elements of the human environment to determine if they would be affected by the alternatives described in Chapter 2 of the EA (environmental assessment). The following two tables summarize the results of that review. Those elements that are determined to be “affected” will define the scope of environmental concern, Chapter 3 of the EA.

Table 1. Critical Elements of the Environment. This table lists the critical elements of the human environment (BLM Handbook 1790-1) which are subject to requirements specified in statute, regulation, or executive order and the interdisciplinary teams predicted environmental impact per element if the alternatives described in Chapter 2 of the Environmental Assessment were implemented.		
Critical Element of the Human Environment	Status 1/ Not Present 2/ Not Affected 3/ Affected	Interdisciplinary Team Remarks 1/ If not affected, why? 2/ If affected, develop cause/effect statement, unit of measure to describe environmental impacts, and if applicable, design features not already identified in Appendix C of the RMP to reduce or avoid environmental harm
Air Quality (Clean Air Act)	Not Affected	The proposed Density Management Thinning has the potential to create slash associated with landing areas. Depending on the size of the landings, burning may be conducted to reduce the fire hazard in these areas. Since burning would be conducted in accordance with the <i>Oregon State Implementation Plan</i> and <i>Oregon Smoke Management Plan</i> the impact of smoke on air quality is predicted to be local and of short duration. As such, the proposed action would have no adverse impact on air quality and would comply with the provisions of the Clean Air Act.
Areas of Critical Environmental Concern	Not Affected	One of the haul routes (Elk Creek road) passes through the Elk Creek ACEC. This ACEC was established to form the habitat area of an active bald eagle nest site. The site has been unoccupied since 1995. Surveys of the site are still conducted each year and if eagles were present measures would be taken to reduce or eliminate adverse impacts to the eagles. It is not expected that the site will be occupied again in the future, but if surveys find that it is occupied then measures consistent with the ACEC management plan will be implemented.

Table 1. Critical Elements of the Environment. This table lists the critical elements of the human environment (BLM Handbook 1790-1) which are subject to requirements specified in statute, regulation, or executive order and the interdisciplinary teams predicted environmental impact per element if the alternatives described in Chapter 2 of the Environmental Assessment were implemented.

Critical Element of the Human Environment	Status 1/ Not Present 2/ Not Affected 3/ Affected	Interdisciplinary Team Remarks 1/ If not affected, why? 2/ If affected, develop cause/effect statement, unit of measure to describe environmental impacts, and if applicable, design features not already identified in Appendix C of the RMP to reduce or avoid environmental harm
Cultural, Historic, Paleontological	Not Affected	There are two known cultural resource sites (SHS 125 and OR0874) located within the project area. Site SHS125 (Yamhill-Tillamook Trail) is not observable on the ground within the proposed density management units and as such would not be affected by the proposed action. The other site (OR0874) was determined not to require protection as it does not contain information that would contribute significantly to our understanding of Coast Range history based upon the following: lack of physical integrity; lack of associated artifacts; and limited research potential (Cultural Resource Assessment, June 2, 2003). Since the proposed action occurs in the Coast Range, the survey techniques are based on those described in Appendix D of the <i>Protocol for Managing Cultural Resources on Lands Administered by the Bureau of Land Management in Oregon</i> . The Coastal Range Inventory Plan only requires post harvest surveys based on slope. As such, surveys will not be conducted until the density management harvest activity is completed. Furthermore, pursuant to the August 1998 protocol for managing cultural resources on lands administered by the BLM in Oregon, that portion of the proposed action that does not involve new ground disturbance (CWD creation and Haul Route Maintenance) is considered to be an exempt undertaking. If cultural resources are found during the implementation of any portion of the proposed action, the project may be redesigned to protect the cultural resource values present, or evaluation and mitigation procedures would be implemented based on recommendations from the District Archaeologist.
Native American Religious Concerns	Not Present	No Native American religious concerns were identified during the public scoping period.
Prime or Unique Farm Lands	Not Present	There is no Prime or Unique Farm Lands within the proposed project area.
Flood Plains (Executive Order 11988)	Not Present	There are no Flood Plains within the proposed project area. The proposed action does not involve occupancy and modification of floodplains, and will not increase the risk of flood loss. As such, the proposed action is consistent with Executive Order 11988.
Threatened or Endangered Plant Species or Habitat	Not Present	Botanical surveys were completed in August 2002. Surveys included any species listed under the Endangered Species Act. No listed species were found.

Table 1. Critical Elements of the Environment. This table lists the critical elements of the human environment (BLM Handbook 1790-1) which are subject to requirements specified in statute, regulation, or executive order and the interdisciplinary teams predicted environmental impact per element if the alternatives described in Chapter 2 of the Environmental Assessment were implemented.		
Critical Element of the Human Environment	Status 1/ Not Present 2/ Not Affected 3/ Affected	Interdisciplinary Team Remarks 1/ If not affected, why? 2/ If affected, develop cause/effect statement, unit of measure to describe environmental impacts, and if applicable, design features not already identified in Appendix C of the RMP to reduce or avoid environmental harm
Threatened or Endangered Wildlife Species, Habitat and/or Designated Critical Habitat	Affected	<p>This project would modify critical habitat of both marbled murrelet and spotted owl. There would be short term negative impacts and long term beneficial impact. There would be loss of snag habitat from logging, a 20-30 year interruption of the snag development process (suppression mortality) that would limit woodpecker populations and thus cavity development. Cavities are very important to northern flying squirrels, the principle prey item for spotted owls in this area. There would be a potential for disturbance to murrelets during the latter part of the critical breeding period, and also potential disturbance to both spotted owl and murrelet during non-critical breeding period. There is a potential for disturbance to bald eagles during the breeding season along suitable foraging streams. The unit of measure for both habitat modification and potential disturbance to spotted owl and marbled murrelets is acres and a narrative discussion; the unit of measure for disturbance to bald eagles is a narrative discussion. Design features that would minimize impacts, include daily and seasonal time restrictions and the creation of snags to offset the lost potential.</p>
Threatened or Endangered Fish Species or Habitat	Affected	<p>This project has the potential to affect Oregon Coast coho or their habitat through harvest and hauling activities that introduce sediment into streams near harvest units or haul routes. There will be a reduction in the potential amount of CWD delivered to stream channels in harvest units. Wildlife treatments to create snags and CWD on the ground have the potential of direct impacts to coho if trees are felled directly into stream channels. Any adverse effects to coho habitat caused by sediment would be short term; in the long term effects to this habitat would be beneficial. The maintenance of haul routes by removing roadside trees is anticipated to reduce the potential of sediment inputs from increased maintenance and trees pulling loose from road cut slopes. The unit of measure to describe these potential effects is a narrative that describes impacts to habitat, individuals or a population. Design features to reduce the amount or timing of sediment inputs include dry season harvest and haul for much of the project, spot rocking and use of sediment traps where necessary.</p>
Hazardous or Solid Wastes	Not Present	There are no Hazardous or Solid Wastes sites within the proposed project area.

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Critical Element of the Human Environment	Status 1/ Not Present 2/ Not Affected 3/ Affected	Interdisciplinary Team Remarks 1/ If not affected, why? 2/ If affected, develop cause/effect statement, unit of measure to describe environmental impacts, and if applicable, design features not already identified in Appendix C of the RMP to reduce or avoid environmental harm
Water Quality (Surface and Ground)	Affected	Project activities (timber harvest, road construction, timber haul, and haul road maintenance) would result in soil disturbance, thereby increase soil erosion and increases in short-term, localized turbidity and sedimentation in local streams. Tree removal from logging and road maintenance could decrease the level of coarse woody debris in Riparian Reserve and stream channels. Project actions are at low risk of increasing the rate of runoff and the severity of flows. A narrative statement is used to describe these potential affects on water quality. The risk of peak flow enhancement is assessed using the Hydrologic Condition Assessment in the Oregon Watershed Assessment Manual.
ODEQ 303(d) listing and TMDLs	Not Affected	Project area streams within the Nestucca River watershed are on the state's 303(d) list for habitat modification and sediment. The Nestucca River, beginning approximately 11 miles downstream from the project area, is listed for flow modification, dissolved oxygen, and temperature. Trask River is listed for temperature, approximately 1.8 miles downstream of the project area, and for dissolved oxygen, approximately 14 miles downstream of the project area. There is expected to be a small, short-term increase in sedimentation as a result of project implementation, however with the incorporation of BMPs and design features that would minimize sediment, the project is expected to be in compliance with the established water quality standards and load allocations (TMDLs).
Downstream Beneficial Uses other than Fisheries. (See Fish Species with Bureau Status and Essential Fish Habitat above.)	Not Affected	Project is not expected to have any effect on beneficial uses (OAR Chapter 340, Division 41, Section 202) other than possibly fish, due to incorporation of BMPs and design features; and the distance of the use downstream from the project area. There are no known municipal, domestic or irrigation water uses within 10 miles of the project area.
Key Watershed	Not Affected	Project action would be in accordance with the management direction in the Salem RMP of reducing existing road mileage with Key Watersheds. Mileage within the watershed would increase slightly (approximately 2.2 miles) during project implementation but would remain below the baseline of 582 miles due to earlier road decommissioning. At the completion of the project, road decommissioning would result in net decrease of 1.6 miles, approximately 0.3 percent decrease from the baseline.
Wetlands (Executive Order 11990)	Not Affected	There are wetlands in the project planning area but they are small (less than one acre) and not extensive. All wetland areas would be avoided, excluded, or otherwise protected in accordance with guidelines disclosed on page 10 of the RMP.
Wild and Scenic Rivers	Not Present	
Wilderness	Not Present	

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Critical Element of the Human Environment	Status 1/ Not Present 2/ Not Affected 3/ Affected	Interdisciplinary Team Remarks 1/ If not affected, why? 2/ If affected, develop cause/effect statement, unit of measure to describe environmental impacts, and if applicable, design features not already identified in Appendix C of the RMP to reduce or avoid environmental harm
Invasive, Nonnative Species (Executive Order 13112)	Affected	Vascular plant surveys indicated existing populations of priority III noxious weeds within the project area. The proposed action will result in soil disturbance which provides an opportunity for the introduction of noxious weeds and/or invasive non-native plant species. The unit of measure is a narrative. Project design features to reduce the potential for introduction include seeding/planting of disturbed areas.
Environmental Justice (Executive Order 12898)	Not Affected	The proposed action is not anticipated to have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

Table 2. Other Elements of the Environment. This table lists other elements of the environment which are subject to requirements specified in law, regulation, policy, or management direction and the interdisciplinary teams predicted environmental impact per element if the alternatives described in Chapter 2 of the Environmental Assessment were implemented.

Other Elements of the Environment	Status 1/ Not Present 2/ Not Affected 3/ Affected	Interdisciplinary Team Remarks 1/ If not affected, why? 2/ If affected, develop cause/effect statement, unit of measure, and if applicable, design features not already identified in Appendix C of the RMP to reduce or avoid environmental harm
Land Uses (right-of-ways, permits, etc)	Not Present	There are no known land uses that will be affected by the density management thinning, haul route maintenance, or snag and CWD creation projects.
Mineral Resources	Not Affected	There currently are no mineral leases within the proposed project area that would be affected and at the completion of the proposed project the area would maintain its current suitability for mineral development opportunities.
Energy Resources	Not Affected	There currently are no energy developments within the proposed project area that would be affected and at the completion of the proposed project the area would maintain its current suitability for energy development opportunities. The proposed action will have no effect on energy development, production, supply and/or distribution.
Fire Hazard	Not Affected	The fuel load as measured in tons per/acre would increase to a minor degree in the 1 hour, 10 hour, and 100 hour (fine) fuels classifications immediately after harvest but would quickly return to pre-harvest levels on all Density Management Thinning units (less than 5 years). This small increase in fuel load would not be expected to result in an increase in fire hazard on the project level scale and the change would not be measurable on the watershed scale. A very small increase in tons per/acre will occur in the Wildlife Enhancement units with the addition of one down log per/acre but would not change the overall fuel loading to a point where it would increase the potential fire hazard.
Recreation	Not Affected	Primary recreation uses in the project area are hunting and OHV riding. The project is not expected to change habitat conditions such that it would have an impact on hunting opportunities. The project area is currently designated as “limited” to existing roads and trails for OHV use. The new road construction and reconstruction is intended to be temporary and not to be added as an “existing” road to the current road inventory, therefore these roads are not intended to become available to OHV use and will be blocked from OHV use. In all other respects the area will remain the same for OHV uses.
Rural Interface Areas	Not Present	
Soils (productivity, erodibility, mass wasting, etc.)	Affected	Project action activities (timber harvest and road construction) would disturb and alter soil properties, such as soil structure and porosity, and lead to a small loss in soil productivity and additive cumulative effect. The units of measure used to describe these effects include a narrative, acres of detrimental compaction/displacement/mixing, and an estimate of acres loss of long-term soil productivity over baseline conditions.

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Other Elements of the Environment	Status 1/ Not Present 2/ Not Affected 3/ Affected	Interdisciplinary Team Remarks 1/ If not affected, why? 2/ If affected, develop cause/effect statement, unit of measure, and if applicable, design features not already identified in Appendix C of the RMP to reduce or avoid environmental harm
Visual Resources	Not Affected	The project area is located in VRM Class IV and therefore has no outstanding visual values. One of the haul routes will pass through a VRM Class I area, however the act of driving through the area will not change the visual values and therefore will have no affect.
Special Status and SEIS Special Attention Plant Species and Habitat	Not Present	Contracts for Botanical surveys for Lichens, bryophytes, and vascular plants were completed in August 2002. In addition, surveys for <i>Bridgeoporus nobilissimus</i> (S&M fungi) were performed by BLM, Tillamook Resource Area, qualified Botanist. Special status plant species surveyed for included: Species listed under the BLM Manual 6840 categories, Survey & Manage Species included in Survey and Manage Standards and Guidelines and Category Assignments (Jan 2001). No listed species were found.
Special Status and SEIS Special Attention Wildlife Species and Habitat	Affected	The action area is potential habitat for Fisher and Goshawk although there is a low likelihood for them to exist in project area, but range and habitat indicate possibility. In the long term the proposed action would improve habitat, while in the short term disturbance would be the greatest negative effect. Existing large CWD is good denning habitat for fisher and is in abundant supply in most of the density management units. Columbia torrent salamanders are known to exist in the project area. No harvest buffers should protect habitat for torrent salamanders except where yarding corridors are cut through, where a small amount of disturbance may occur that may affect individuals. Northern red-legged frog is present in the project area; modification of upland habitat may limit post-breeding dispersal throughout the project area. The unit of measure for evaluating the level of effects to a species would be a narrative discussion. Required surveys for SEIS Special Attention Species (Survey and Manage) were completed to protocol. Three mollusk species were surveyed for and none were found. Protocol for red tree vole surveys was not triggered due to the stand age and lack of remnant large trees.
Fish Species with Bureau Status and Essential Fish Habitat	Affected	This project has the potential to affect Pacific lamprey, cutthroat trout, steelhead and Essential Fish Habitat for coho and Chinook salmon by harvest and hauling activities that could introduce sediment into streams near harvest units or haul routes; and the reduction in CWD potential outside of no-harvest buffers. The snag and CWD creation in both the harvest and wildlife enhancement units has a greater potential of affecting cutthroat directly with similar potential affects to the rest of the fish assemblage with the exception of Chinook salmon. The maintenance of haul routes by removing roadside trees is anticipated to reduce the potential of sediment inputs from increased maintenance and trees pulling loose from road cut slopes. The unit of measure to describe these potential effects is a narrative that describes impacts to habitat, individuals or a population.

Table 2. Other Elements of the Environment. This table lists other elements of the environment which are subject to requirements specified in law, regulation, policy, or management direction and the interdisciplinary teams predicted environmental impact per element if the alternatives described in Chapter 2 of the Environmental Assessment were implemented.

Other Elements of the Environment	Status 1/ Not Present 2/ Not Affected 3/ Affected	Interdisciplinary Team Remarks 1/ If not affected, why? 2/ If affected, develop cause/effect statement, unit of measure, and if applicable, design features not already identified in Appendix C of the RMP to reduce or avoid environmental harm
Forest Vegetation Associated with Late-Successional Reserves and Riparian Reserves	Affected	Implementation of the proposed density management thinning is expected to accelerate the development of some late-successional forest structural features and increase stand resistance to the impacts of Swiss needle cast disease on Douglas-fir. The recruitment of smaller-sized snags would be largely curtailed for at least 20 years after thinning. The snag and coarse woody debris (CWD) treatment is expected to provide a slight short-term increase in the structural diversity of stands in the vicinity of the proposed density management thinning. The anticipated effects of the proposed cutting of selected 15- to 30-year-old hardwood trees along designated roads would be some short-term small openings where individual trees were removed. These small openings are expected to close relatively quickly. The unit of measure is a narrative and acres treated.

Figure 1 - Project Location

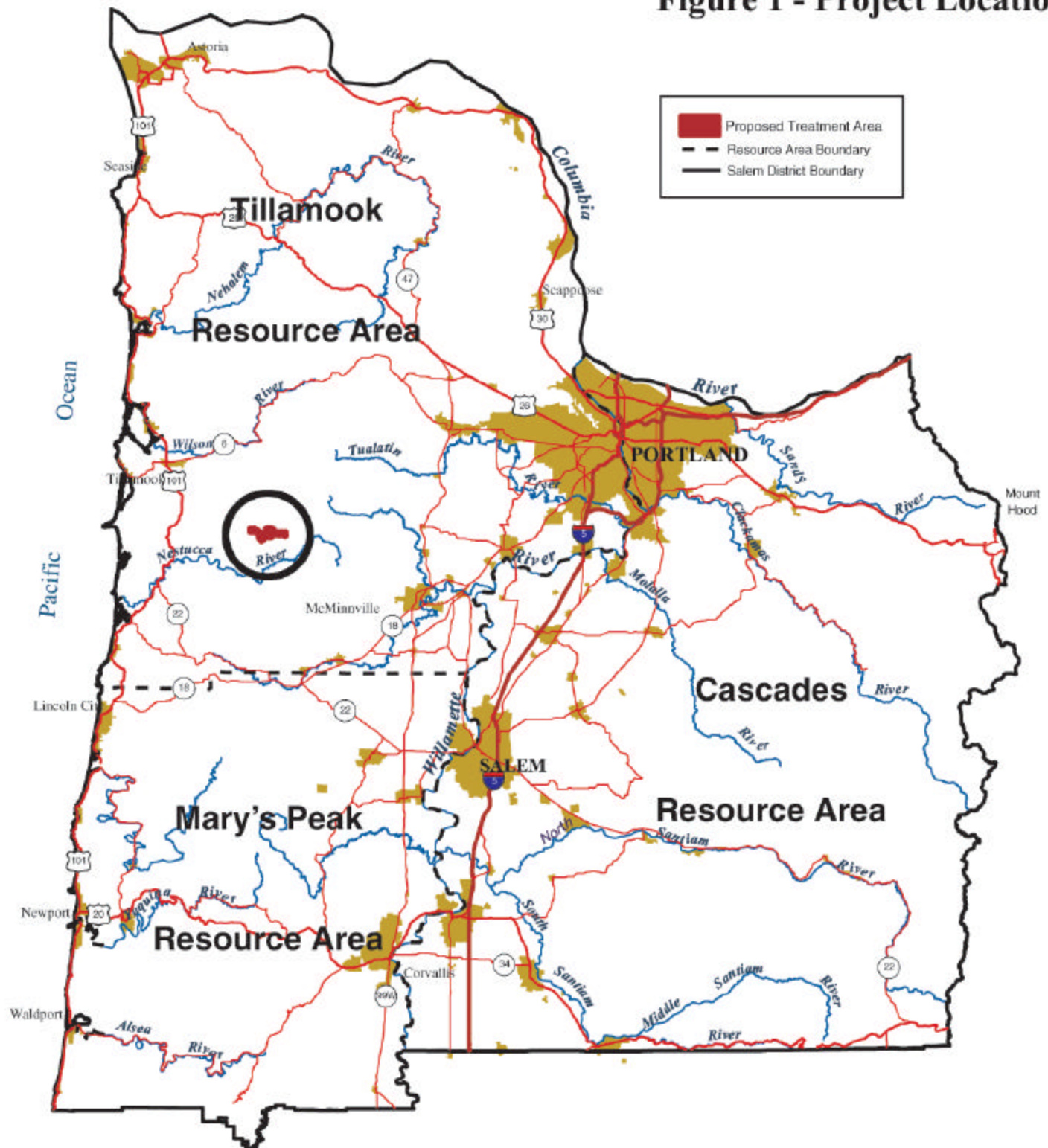
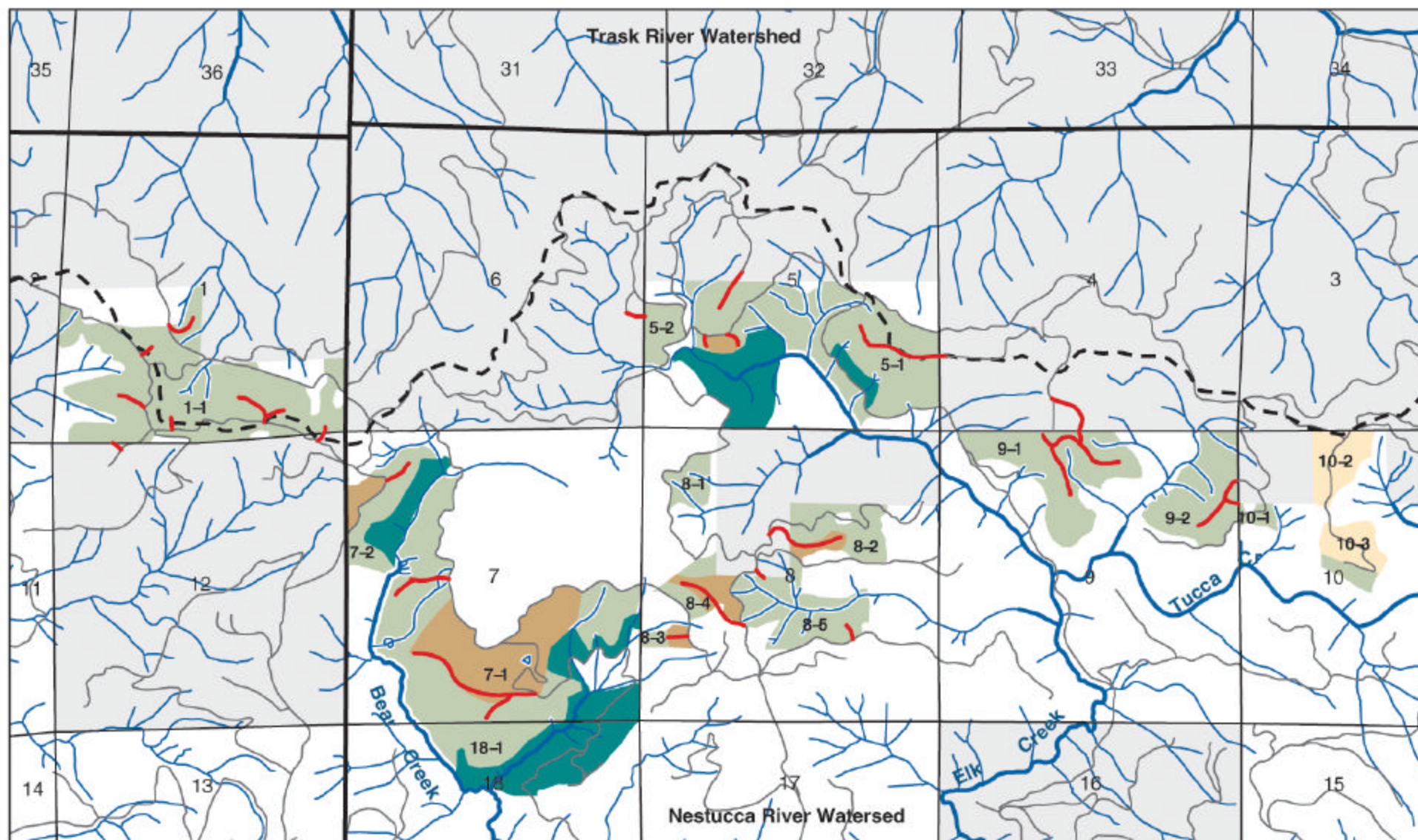


Figure 2 – Proposed Treatment Areas



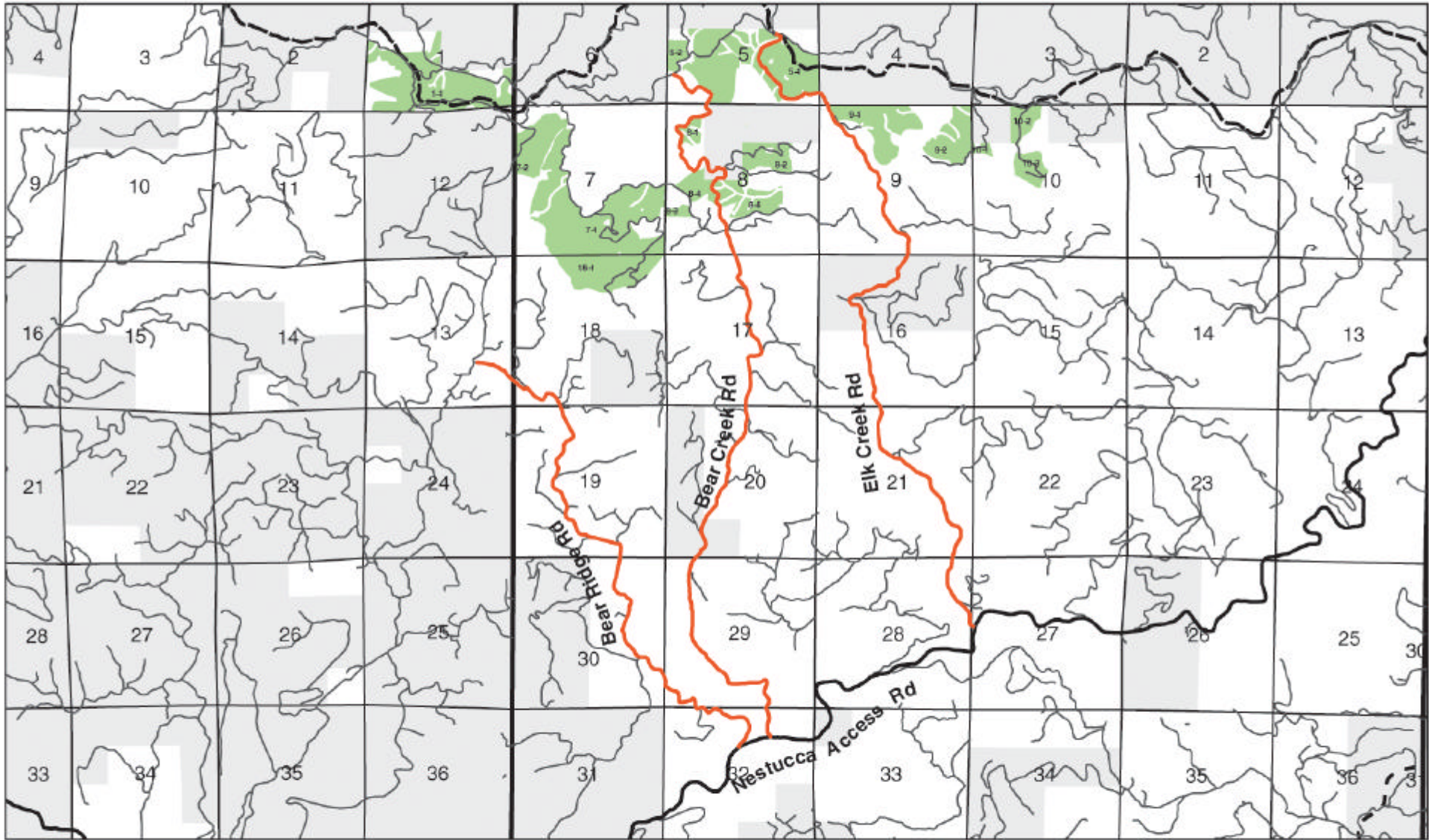
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from available source data and may not meet U.S. National Mapping Accuracy Standards of the Office of Management and Budget.



0 500 1,000 2,000 3,000 4,000 Feet



Figure 3 –Haul Road Maintenance Locations



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1 2000 4000 6000 8000 Feet

- Haul Road Maintenance Areas
- Stand Treatment Areas
- Non-BLM Lands